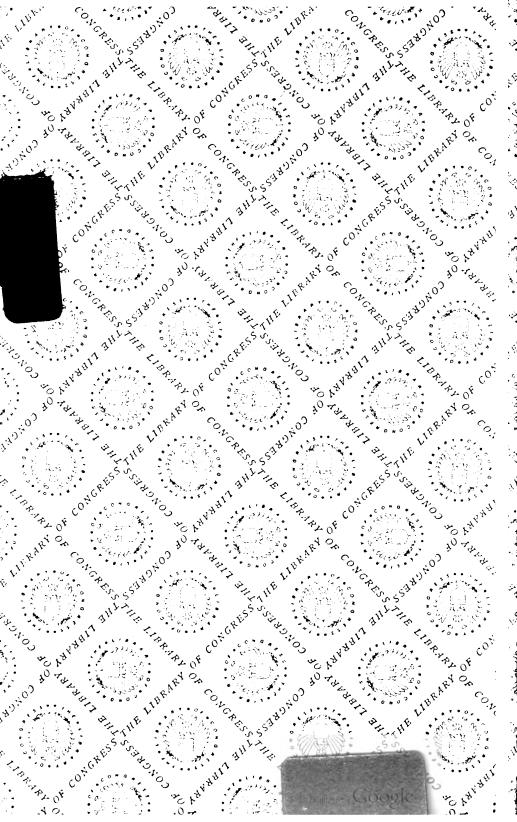
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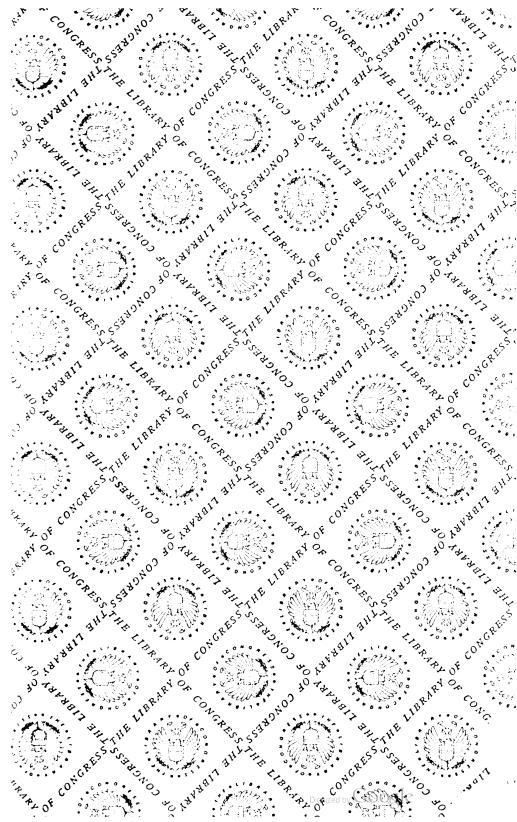


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AUTHORIZATION FOR MILITARY PROCUREMENT, RESEARCH AND DEVELOPMENT, FISCAL YEAR 1971. AND RESERVE STRENGTH

HEARINGS

BEFORE THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

NINETY-FIRST CONGRESS

SECOND SESSION

ON

S. 3367 and H.R. 17123

TO AUTHORIZE APPROPRIATIONS DURING THE FISCAL YEAR 1971 FOR PROCUREMENT OF AIRCRAFT, MISSILES, NAVAL VESSELS, AND TRACKED COMBAT VEHICLES, RE-SEARCH, DEVELOPMENT, TEST, AND EVALUATION FOR THE ARMED FORCES, AND TO PRESCRIBE THE AUTHOR-IZED PERSONNEL STRENGTH OF THE SELECTED RESERVE OF EACH RESERVE COMPONENT OF THE ARMED FORCES. AND FOR OTHER PURPOSES

> PART 2 (of 3 parts)

MARCH 10, 11, 12, 17, 18, 19, AND 20, 1970

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(II)

TUESDAY, MARCH 10, 1970

U.S. SENATE, COMMITTEE ON ARMED SERVICES, Washington, D.C.

The Committee on Armed Services met at 10:10 a.m., in room 212, Old Senate Office Building, Hon. John Stennis (chairman) presiding. Present: Senators Stennis (chairman) Symington, Cannon, Young of Ohio, McIntyre, Byrd of Virginia, Smith of Maine, Thurmond,

Dominick, Murphy, Goldwater, and Schweiker.

Of the staff of the Committee on Armed Services: T. Edward Braswell, Jr., chief of staff; and Labre R. Garcia, professional staff member.

Of the staff of the Preparedness Investigating Subcommittee: James T. Kendall, chief counsel; Ben J. Gilleas, director of investigations; Ed Kenney, Don L. Lynch, Hyman Fine, David A. Littleton, and George Foster, professional staff members.

Of the staff of the Appropriations Subcommittee: William W.

Woodruff, counsel.

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LOCKHEED CONTRACTUAL PROBLEMS

Chairman Stennis. Our committee will please come to order.

The full committee meets in executive session this morning to hear the Deputy Secretary of Defense, Mr. David A. Packard, on two separate matters. The first item on which Mr. Packard will testify will be that of the Lockheed Aircraft Corp. and its present problem in connection with certain defense contracts it holds with the military services. On March 5, 1970, the Chair received a letter from the Department of Defense transmitting a copy of a letter from the Lockheed Corp. to Mr. Packard which discussed certain contractual disputes between the corporation and the military services and stating that "We cannot maintain uninterrupted performance on these programs without receiving significant financial assistance from the Department of Defense." This letter, which has been distributed to each committee member, discussed certain aspects relating to the C-5A, shipyard claims, the AH-56A (Cheyenne helicopter), and the SRAM. The Chair might observe at this point that the pending procurement legislation contains a request for \$544 million for the C-5A program and of this total, \$200 million is a contingency request for possible payments above the ceiling price of the contract. There are several

floating ceilings in that contract, but that was what we called the basic

ceiling price.

It is the understanding of the Chair that Mr. Packard at this meeting does not intend to propose any specific course of action but to outline the background and details of this problem. If he wishes to propose a course of action, of course, he may. Following the C-5A testimony and discussion, we will hear Mr. Packard on the current program for the MBT-70, main battle tank.

Members of the committee, as soon as I got the letter regarding Lockheed's problems, I thought that we ought to hear from Mr. Packard. This is not an investigation. At this point it is a briefing for the information of the members of this committee, on such points as the

Secretary wishes to make, or any proposals he has to make.

We also have pending the main battle tank, so I just put the two

together and asked him to come this morning.

We have with us, too, this morning, Secretary Shillito. We are glad to have you here, Mr. Secretary. You can make a statement if you wish.

This afternoon, members of the committee, at 2 o'clock, we will begin with the Air Force. Our first witnesses will be Secretary Seamans, and Chief of Staff Ryan.

COMMITTEE PROCEDURE

Senator SMITH. Mr. Chairman, the other day when we were in joint session—Defense Appropriations, and Armed Services—I spoke of the rules of the committee that required the statements to come in advance, saying that I was not able to come in and listen to a statement and ask meaningful questions that would be of any help to the record.

It seemed to me a great waste of time. Again this morning we don't have a statement that comes in. I called the staff yesterday. This morning, in my morning mail, the statement which was anything but respect for this committee, the statement that was made on the House side, was received, and I was told by the staff that we could look that over, but that there would be some changes before this committee meeting.

I again say that until we can get the statements at least 24 hours ahead, or a few hours ahead, so that I can have a chance to read it and study it a little bit, and get some questions prepared, I shall submit

my questions for the record to be answered for the record.

I think it is an insult to the committee for these people to come in

here and give a statement 5 minutes before the meeting begins.

Chairman Stennis. Senator Smith, as always, you are mighty nice about it. You are willing to submit your questions for the record to be answered, and, as chairman, I appreciate that.

I did not mention expressly having a statement or sending it because I looked upon this as a briefing. I did not want it to go out that

we were starting an investigation right now.

They might have gotten the idea that a statement was not expected on this C-5A matter at this time. We will go into it fully later, of course.

Senator SMITH. Mr. Chairman, with the statement going to the House, a copy of that statement coming over here, it would indicate very clearly that they knew they were expected to submit a statement.

very clearly that they knew they were expected to submit a statement. Senator Symington. Mr. Chairman, I would like to associate myself with the remarks of Senator Smith. This matter is one that is of great interest to many of my friends in the banking business, in industry, primarily the aircraft industry. All I know about it is what I have read in the papers, also a letter that was sent to me by the chairman of this committee, with a copy of the letter that you wrote to him at that time, dated March 5. I would hope that when we consider these matters we have a chance to go over them with the experts on the committee, and also with people on the outside.

As an illustration, I was told that the last large loan to Lockheed was loaned by the bankers with the proviso that the money could only be used for commercial business and could not be used

for Government work.

If that is true, it means that the Government, in effect, the taxpayer, would be the crutch in this situation, and the problems incident to this were emphasized by the fact I heard that the company had lost a couple of hundred million dollars in its commercial work. I don't know whether any of these rumors are correct, but I do want to associate myself with Senator Smith's statement at the hearing this morning—that if we are going to function with intelligence at these meetings, we ought to know what we are going to have previous to the meetings, so that we can analyze it and talk against the record. Chairman Stennis. I appreciate the sentiments of the members.

The Chair will just have to do the best he can, ladies and gentlemen.

This is, as I say, a briefing.

Off the record.

(Discussion off the record.)

Chairman STENNIS. Back on the record. All right, Mr. Packard, will you proceed now in your own way. You have heard how the members feel about these statements. I know that all of you will try harder to get those statements in here. By the way, the Secretary of the Air Force's statement is here now, and it is classified. I thought it was a good statement.

All right, Mr. Packard.

STATEMENT OF HON. DAVID PACKARD, DEPUTY SECRETARY OF DEFENSE; ACCOMPANIED BY BARRY J. SHILLITO, ASSISTANT SECRETARY OF DEFENSE (INSTALLATIONS AND LOGISTICS)

Mr. PACKARD. Mr. Chairman and members of the committee, I would like to tell you that I understand your concern, and I want to offer you my apologies for not getting the statement here sooner. We received the letter from Lockheed last Wednesday.

(The letter appears on p. 832–834.)

Mr. PACKARD. We had known there were some problems, but it really was not until they were willing to lay the whole matter on the table that we could get into this thing as deeply as we should have. But I understand your concern, and we will do our best to get the state-

ment to you sooner next time. I want you to know that I apologize. We appreciate the opportunity to discuss with you today the severe financial crisis that faces one of our largest defense contractors, the Lockheed Aircraft Corp. As you are aware, I testified yesterday on this subject before the House Armed Services Committee.

I might say here again that this was very short notice. We were scheduled to testify on the SAFEGUARD program, and so we are

bringing this matter up to you with very little advance notice.

Because we felt it important that the Congress and the American public be informed promptly of the Lockheed request for urgent consideration of its financial status with regard to production of certain defense items, we made public last week a letter from the corporation on this subject. At that time, Secretary Laird made this document available to this committee. A copy of this letter is attached.

Last week I met with a group of bankers which last year extended Lockheed a large line of credit. Also attending the meeting at the Pentagon for an informal exchange of views were representatives of each of the military departments as well as the Assistant Secretary of

Defense—Installations and Logistics—Mr. Shillito.

The Government contracts which have contributed to Lockheed's present financial problems were all executed before the present administration took office. These include: the C-5A contract which was awarded in October 1965; a contract for the Short Range Attack Missile (SRAM) awarded to the Boeing Co. in November 1966 with Lockheed participating as a subcontractor for the propulsion system; nine Navy ship contracts awarded from 1961 through 1965; and the Army contract for the development of the AH-56A helicopter (Cheyenne) which was executed in March 1966. The AH-56A development contract contained an option for production quantities which was exercised by the Army in January 1968.

Shortly after taking office last year we became aware that difficulties were being encountered under these four contracts. We took various actions in an attempt to bring both the technical and cost problems under proper control. The crisis which the company now faces is the result of the simultaneous impact of problems with these four large military programs, together with a large commercial program which may also place a severe financial strain on the company.

The severity of this crisis is just now becoming apparent.

I would like to talk in general terms about the problems involved in each of these contracts. If you wish, the military departments can

brief you in more detail on each of them at a later date.

Cheyenne.—In May of last year the Army terminated for default the Cheyenne production contract because of technical problems which the contractor had not resolved. Lockheed has appealed this default termination to the Armed Services Board of Contract Appeals (ASBCA). A decision is not expected before the first of next year at the very earliest. If the Board decides for the Government, Lockheed will be required to return approximately \$54 million in payments that the Government had made under the production contract. In addition, Lockheed may be obligated to pay damages, currently estimated to range between \$30 and \$40 million, for the Government's cost in terminating certain associated prime contracts. The company's total obligation to the Government would be lessened by

the value of any work-in-process inventory and tooling which the

Government might accept.

Lockheed has indicated that its expenditures under the defaulted contract amounted to \$89 million as of the end of 1969. According to Lockheed's estimate, this amount will eventually reach \$137 million

when all suppliers and subcontractors have been paid.

Based on the continuing need for an aircraft of this type, work on the development contract has been permitted to continue. The contract ceiling price is approximately \$96 million, and the Army has paid Lockheed \$86 million for work on this phase of the program. Lockheed states that it has incurred costs of approximately \$72 million above the \$96 million ceiling through December 31, 1969, and estimates an additional \$45 million will be needed to complete performance of a restructured development program.

If the Army position prevails on the production contract and development expenditures continue as projected, the company will have spent in excess of \$200 million more than it will receive under the contracts, a substantial financial burden to carry until these matters

are resolved.

I might point out that even if the issue is resolved in favor of the contractor, the time factor involved here means that there will be a

substantial burden for the contractor to carry.

Ship Claims.—Claims in the amount of \$173.6 million have been submitted by Lockheed Shipbuilding & Construction Co. covering nine contracts for a variety of ships. The total claims approximate quite closely the amount of the anticipated Lockheed loss under these contracts.

The principal bases of the Lockheed claims include defective or late lead yard plans, late Government-furnished equipment and information, defective Government specifications, change orders, and

interest.

The factual investigation is nearly complete and the Navy will be in a position to offer settlement on all of these claims this year. If any disputed amounts remain, the contractor will have the option of taking the questions before the Armed Services Board of Contract Appeals in accordance with established procedures.

A portion of the Lockheed loss on these ship contracts can be attributed to the fact that the contractor has experienced abnormally large costs on contracts which were awarded on a firm fixed-price

basis following keen price competition.

SRAM.—As prime contractor for the SRAM program, Boeing has a fixed-price incentive subcontract with Lockheed on which the original target price was \$5.03 million. Due to Government directed changes, the original target price of this subcontract may increase to a ceiling price of about \$26 million. Lockheed estimates they will expend a total of about \$62 million to complete performance on the subcontract.

Lockheed's claim for \$50 million to the Air Force via Boeing alleges "economic impossibility" of performance at the time the contract was executed. It has been tentatively rejected by the Air Force

but a formal determination has not yet been issued.

C-5A.—With respect to the C-5A there are two principal issues at dispute. One is whether the Air Force did or did not exercise its

option to buy 115 aircraft. The second issue relates to a very complicated question of interpretation as to how the contract provision on abnormal escalation impacts on the repricing formula. In addition to these two major issues, there are other provisions which cause the current contract to be a very inadequate instrument.

These disputed issues have resulted in a continually growing spread between Lockheed's expenditures and what the Air Force, under its interpretation of the contract, can pay the company through

the end of the program.

On this matter, I think we must not lose sight of the fact that at the time of contract award in 1965, Lockheed agreed to a target price of \$1.9 billion to build 115 aircraft. As of last July 1969, the estimated cost had grown to \$3.2 billion for the same 115 aircraft (neither number includes spares and other miscellaneous items). This significant cost growth was a factor in our decision late last year not to extend the program beyond the 81 aircraft on order. The Air Force now estimates that Lockheed's total cost to produce these 81 aircraft will be about \$3,164 million, exclusive of spares and other support items.

Under the Air Force's interpretation of the contract, the price that the Air Force would pay for these 81 aircraft will be approximately \$2,516 million, thus resulting in a loss to Lockheed exceeding \$640

million.

Because of the magnitude of the gap between the Government position on price and the cost to Lockheed, the problem of financing the C-5 program is severe. Air Force payments on the contract can be continued through the current fiscal year; that is, until June of this calendar year, with funds presently available at a rate which we believe will meet Lockheed's expenditures. In addition, funds requested in the fiscal year 1971 budget (exclusive of a \$200 million contingency request) will be sufficient, we believe, to support Lockheed's expected expenditures on the C-5 through late calendar year 1970. That means to say that the cash flow problem through most of calendar 1970 can be handled without, we think, special action. Near the end of 1970, Lockheed's deficit on the C-5 is expected to grow at a rate of \$30 to \$40 million a month. Our examination of the financial condition of the company, while not yet complete, supports their contention that they will not be able to carry a deficit of this magnitude. This problem must, therefore, be resolved or the C-5A program cannot continue.

The fiscal year 1971 budget was prepared on the basis of the Air Force's interpretation of the contract with a \$200 million contingency fund added. Information received in the last few days indicates that even with this additional amount there may not be sufficient funding to support the C-5A program through the fiscal year 1971 budget period. Within the next few days we expect to determine the total amount required. Additional dollars will also be required in fiscal year 1972

to complete the funding.

In ordinary contractual situations, when disputes arise as discussed above, the contractor keeps on working and does not "collect" until the dispute is finally settled through the ASBCA and possibly the courts, which may be a timespan of several years or more. This has proved workable when relatively minor sums of money are involved.

On these four programs, however, we are faced with a degree of financing that will be impossible for Lockheed to carry while awaiting

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adjudication. Thus, we are confronted with determining an appropriate course of action.

Alternative courses of action

I will outline some of the alternative courses of action. I do not propose to make a recommendation today. This is a very serious and important matter, and it is important that we make sure we have all of the facts, and that we take time to consider them, before we come up with a recommendation. But I wanted to outline for you some of the possible courses of action that are available to us.

I want to emphasize that in all our considerations of this priority problem, the public interest must and will be paramount. For that reason, we intend to take no precipitate action. We intend to examine

all the facts very carefully.

One course is to allow these questions to be resolved by established procedures. If we follow this course a substantial amount of interim

financing by the Government will be necessary.

A second course is to negotiate an overall settlement with the company. This course would require carefully worked out procedures to protect the public interest and would still require significant financing.

Reorganization of the company, merger possibilities and, of course, bankruptcy proceedings are other possibilities. While these have not yet been fully explored they do not, at this time, appear to offer very attractive solutions to the problem, either from the standpoint of the Government or of the company.

The guaranteed loan authority under title II of the Defense Production Act (V-Loan) and the exceptional authority under Public Law 85-804 are two means available to us for financing. Public Law 85-804 permits contracts to be amended without consideration to provide funds to a contractor whose productive ability is threatened.

The amounts required of the Government under practically all sollutions would, of course, depend upon funds being appropriated by the Congress. The total requirements might be distributed over the next 2 or 3 fiscal years. Regardless of the alternatives selected, however, significant additional financing must be provided if the Government is to obtain the essential defense products currently under contract.

I might say that those products include the items under these four contracts, as well as other products that the company has under con-

tracts from us that are not in trouble as far as we now know.

That is basically the problem as we see it today. As I have stated, we are exploring all ways to resolve this problem. I have asked the company for additional data which will support, by specific time periods and programs, their short-term cash needs. This will enable us to determine the financing needed for the company to continue work on these contracts. We will take every step necessary to assure that the Government's interest is protected as we proceed to a resolution of this problem.

It is an urgent matter that we must find a satisfactory solution. Special teams have been constituted in each of the departments as well as in my office to focus priority on the issues involved. We are in continuous consultation with the company officials and with their bankers. As a matter of fact, I have their bankers coming in again on Thurs-

day of this week.

We intend to keep your committee fully informed of our progress toward a solution and we will, of course, welcome your suggestions and recommendations.

Mr. Chairman, that completes my formal statement, and I will be glad to entertain questions from the committee.

(The letter from Lockheed Corp. follows:)

LOCKHEED AIRCRAFT CORPORATION, Burbank, Calif., March 2, 1970.

Hon. DAVID PACKARD, Deputy Secretary of Defense, The Pentagon, Washington, D.C.

DEAR MR. SECRETARY: We have completed a review of the current status of a number of our major Department of Defense programs in connection with which our corporation has filed claims or has been compelled into contractual disputes with the military services. It has become abundantly clear to us that the unprecedented dollar magnitude of the differences to be resolved between Lockheed and the military services make it financially impossible for Lockheed to complete performance of these programs if we must await the outcome of litigation before receiving further financing from the Department of Defense. We consider it imperative that some alternate method of resolution of these differences be immediately and seriously pursued in order to avert impairment of the continued performance of programs essential to the national defense.

We realize that the military services normally expect their contractors to continue performance, including financing, pending administrative review and resolution of any disputable matter. In the present instances, however, the cumulative impact of the disagreements on four programs creates a critical financial problem which cannot be supported out of our current and projected assets and income. We have intensified our cost reduction efforts, have eliminated dividends to our stockholders, have reduced drastically our planned expenditures for fixed assets, and intend to reduce our overhead costs and cut discretionary outlays in all other possible areas. We also intend to continue pursuit of all possibilities of financing from the private sector. Despite these efforts, we must state that we cannot maintain uninterrupted performance on these programs without receiving significant financing assistance from the Department of Defense. Also, in absolute candor, we do not consider that Lockheed, even if it were capable of so doing, should be expected alone to sustain for an indefinite period the financial burden while awaiting the outcome of litigation resulting largely from drastic innovations in procurement procedures utilized by the military services.

However, if absolutely necessary the parties may be forced to have their major disagreements involved in these programs settled through litigation. Indeed our obligations to our stockholders will require us to take this course of action if the only settlement proposals which can be evolved would ruinously deplete our corporate resources. Moreover, it should be recognized that contractual disagreements of such enormous magnitude represent a breakdown in

the procurement processes.

Without disregarding our own deficiencies, the common ingredient in three of the four programs which cause our present difficulty, namely, the C-5A, the SRAM, and the AH-56, is the fact that under the Total Package Procurement procedure development was required to be undertaken under a fixed price type contract with concurrent production commitments with respect to price, schedule, and performance. Although it was assumed that state-of-the-art advances were not required in these programs, it is generally admitted that these assumptions were incorrect. Although industry generally, including our company, perhaps erred in competing for contracts under this system, the system itself and its use were the responsibility of the military departments.

We believe that the hindsight of today shows us that the procurement procedure utilized for these programs was imprudent and adverse to our respective interests. We did not contemplate, nor do we believe anyone in the Department of Defense ever contemplated, that these contracts could generate differences of opinion involving such vast monetary amounts as, for example, exist on the C-5A program. Nor did either party appreciate the major hazards involved in undertaking production on the Cheyenne program before technical problems on the development program had been solved. Considering that these

problems were known to the Army at the time the letter contract for production was issued in January 1968, and that the parties subsequently had been unable to reach agreement on a definitive contract, the unprecedented action of terminating this letter contract under a fixed price default clause is difficult to understand.

Despite the growing awareness that the total package method utilized in these programs is virtually unworkable, there seems to be little disposition to correct existing contracts on terms which most contractors can accept or to recognize that litigation is a seriously inadequate avenue. Even on the shipyard contracts where the total package concept was not involved, the fact the bulk of the shipbuilding industry has encountered grave trouble as indicated by the more than a billion dollars in contract claims suggests that the system, rather than solely individual deficiencies, was a major contributor to the problem.

Apart from the disastrous potential for our own company and its effect on Department of Defense programs, litigation of these problems may well have grave consequences on the Department of Defense's ability to secure the industrial support which it traditionally has required, regardless of who ultimately wins. With this in mind, whatever steps may be taken to alleviate our immediate financial problems I wish to urge that the way be left open to negotiate settlements which are within the ability of the corporation to absorb.

Although I know you are generally familiar with the aforementioned programs, I would like briefly to recapitulate the critical financial problems they cause and to urge interim financing actions which should be taken immediately to avoid impairment of continued performance.

C-5A

On January 19, 1970, our appeal from the Contracting Officer's decision concerning the C-5A contract dispute was docketed by the ASBCA and our complaint has been filed. All parties are cooperating toward the earliest possible resolution of these issues by the Board, but most optimistically it would appear this cannot be accomplished before late 1971.

In addition, there is a distinct possibility that the decision of the Board may be appealed to the Court of Claims, and consequently a final decision may not be made until 1973 or 1974. The Air Force has indicated it will not provide funds for this contract which will exceed the estimated contract price as the Air Force interprets this contract. Under these conditions, the Air Force funding would at best be adequate only until near the end of this year, However, in order to complete the delivery of 81 aircraft and related items during 1971 and 1972 an additional \$435 million to \$500 million will be required to cover production expenditures. Lockheed cannot provide such funding and believes the Air Force should advance the necessary funds pending the outcome of the litigation. This could be accomplished by an amendment to the current contract which could appropriate safeguards for both parties with respect to preserving their rights in litigation.

SHIPYARD CLAIMS

At the present time, the Lockheed Shipbuilding and Construction Company has performed, or is performing, on 9 contracts for several classes of new ships. More than \$175 million of contractual adjustment claims have been presented to the Navy to date. As of December 29, 1969, amounts expended by Lockheed on these claims exceed \$100 million and are expected to continue at a rate of \$3 to \$4 million per month. These claims have been under consideration for many months with provisional payments of only \$14 million made to date.

We believe the solution to this problem lies in an immediate increase in provisional payments to an aggregate of \$85 million. We understand the Department of the Navy plans to settle the majority of these claims during the last three months of 1970 which should permit the payment of the balance of the amounts due Lockheed Shipbuilding and Construction Company by the end of this year. Should there be any delay in the Navy's present schedule an additional amount of provisional payments would be required. Immediately increasing provisional payments to \$85 million would substantially ease the financial burden at the Shipbuilding Company and permit continued work toward the completion of the DE 1052 and LPD class ships now in process. In addition, arrangements can be made which will not impair the rights of either Lockheed Shipbuilding and Construction Company or the Navy with respect to negotiation and final settlement of these claims.

AH-56A, PHASE III

On May 19, 1969, the Army Contracting Officer issued a final decision terminating this letter contract for default. Lockheed's appeal from this decision was made to the ASBCA on May 22, 1969, and both Lockheed and the Army are proceeding in accordance with the rules of the Board. It is unlikely that the Board will hear this case before midyear and that a final decision can be made before the first quarter of 1971. As of the end of 1969, total costs incurred by Lockheed (both prior and subsequent to the Contracting Officer's decision) amount to approximately \$89 million. Prior to the Contracting Officer's decision the Army had made progress payments amounting to \$53.8 million. We have reached an agreement with the Army under which these progress payments may be retained by us pending a decision by the ASBCA. However, during the early part of 1970, costs incurred may reach a total of some \$110 million requiring a total cost participation by Lockheed of some \$60 to \$65 million which may be increased by the necessity of payment by Lockheed to subcontractors of additional amounts. We suggest that the Army increase the amount of progress payments to a minimum of 90% of the costs incurred, and continue such payments until resolution of this case by the Board of Contract Appeals or the Court of Claims. The same agreement under which Lockheed is currently retaining the \$53.8 million or progress payments could apply to these additional provisional payments.

SRAM

The Lockheed Propulsion Company is the propulsion system subcontractor to the Boeing Company under its prime contract with the Air Force for DDT&E of the Short Range Attack Missile (AGM-69A). On December 29, 1969, Lockheed Propulsion Company and the Boeing Company presented a Contract Adjustment Claim to the Air Force under Contract AF 33 (657)-16584 in the amount of \$50 million. At the present time, Lockheed Propulsion Company is continuing its performance of its subcontract and has incurred costs approximating \$30 million in excess of the \$16.9 million received to date. Continued performance during 1970 is expected to add more than \$15 million. Negotiations of the issues involved in our claim are currently being sought jointly by Lockheed Propulsion Company and Boeing with the Air Force. It is possible that most or all of the issues will become the subject of an ASBCA case in the next few months. We believe that a provisional payment to Lockheed Propulsion Company of \$25 million should be authorized under the Boeing prime contract pending final resolution of the issues. As is the case with the AH-56A and the C-5 programs, suitable arrangements protecting the rights of both parties could be arranged.

In summary, in the absence of prompt negotiated settlements there is a critical need for interim financing to avert impairment of continued performance. We urgently solicit the assistance of the Department of Defense in providing such financing.

Very truly yours,

D. J. HAUGHTON, Chairman of the Board.

CONTINGENCY FUNDS

Chairman Stennis. I won't have a great many questions, members of the committee. We want to give everyone a chance to get into this, but let's get at the money first that is in this bill that we are considering.

There is \$544 million in the Air Force items here; \$200 million you say in your statement now is frankly marked for a contingency. Now is that a contingency above what you consider the contract price?

Mr. PACKARD. The \$344 million for procurement of the C-5 in the fiscal year 1971 budget is what the Air Force would be obligated to pay under their interpretation of the contract. We were aware that there was a problem, that it was a significant one, and we added a \$200 million contingency fund which would be available if authorized

to apply against this financing problem that we are discussing here today. This \$200 million, if authorized, would be available to apply against the \$600-plus million gap we have between the Air Force position and what the company says its costs are going to be.

Chairman STENNIS. The fact that you put in the \$200 million in the budget indicates very strongly that, if you get the money, you are planning to go beyond what the contract actually provides for.

Mr. PACKARD. Mr. Chairman, this indicates the fact that we knew we had a problem, even if we did not know the extent of the problem. We were able to talk about the C-5 contract, but we had no real authority to get into total company problems until they requested us to do so. They have done that now, so now we are in a position to get in and look at the whole thing.

There are a number of solutions, and we are going to explore all of them. All I can say to you is that the \$200 million was earmarked specifically to apply against this problem. Whether it will be enough or not depends upon what kind of a recommendation we can come

up with for your consideration.

Mr. Shilling. The \$200 million, Mr. Chairman, makes it quite clear, I think, that we knew the company just could not finance the impact of this.

Chairman Stennis. It is my purpose, and I believe the purpose of every member, however they may vote on an item, that when we go to the floor on this bill, what is in there the majority of the committee expects to be able to prove is hard facts and hard money, along with the reasons to justify it. Sometime between now and the markup we certainly expect you to come right down on a hard figure. I want you to respond to that directly, please.

Mr. PACKARD. Mr. Chairman, I recognize the urgency of this problem, and I recognize that it is my responsibility and the responsibility of the Defense Department to come up with a recommendation which

we believe will provide a solution to the problem.

We are going to do that as quickly as we can, but I want to emphasize that this is a very serious problem. I don't want to come up with a recommendation until we have looked very carefully at all of the facts and all aspects of the problem, but I hope we can have a recommendation for your consideration before you get to the markup of the bill. I can't promise you that we will have it by then, but I can promise you we are going to try.

Chairman Stennis. I think it is highly important, Mr. Secretary and gentlemen, not only on account of this item alone, but because this item will be creating the sentiment and atmosphere of the whole military program to a degree. If we have to take the bill to the floor with uncertainty about this item, I think that will be very unfortunate.

At the same time I see you have a big problem on your hands. If you could put a team together headed by yourself, to concentrate on this matter and help us with it, why, I think it would be very timely and is a must, or else come back and say, "We tried every way we knew and we could not finalize this thing."

Mr. PACKARD. Mr. Chairman, I recognize that I have got a job to do

here. I am well aware of that.

SHIP CLAIMS BREAKDOWN

Chairman STENNIS. All right.

The Chief of Staff tells me there is \$210 million in the bill for ship claims. Do you know how much of that is for Lockheed? If you don't

have it now, you can supply that for the record.

Mr. Shillito. The \$210 million is for claims and cost growth. There is roughly [deleted] million for fiscal year 1970 and 1971 as I recall for Lockheed. Captain, is that right? This is Captain Holfield, who is from the Navy.

Chairman Stennis. Well, if you don't have it—did you say there was

\$210 million for Lockheed?

Mr. Shillito. In the total for fiscal year 1971. The Lockheed amount is [deleted] million.

Chairman STENNIS. [Deleted] out of the 210?

Mr. Shillito. That is right, plus [deleted] million in fiscal year 1970. Chairman Stennis. What do you call that [deleted] million? Is that an over, a plus or what?

Mr. Shillito. This would be available for use in negotiating the

\$176 million in claims that have been submitted by Lockheed.

Chairman Stennis. And you don't admit that that much is owed

them though?

Mr. Shillito. No, sir; we don't. In fact it is the Navy's position that it is significantly less than the \$176 million.

C-5A COST

Chairman Stennis. Of course, Mr. Packard, on the C-5A matter, you contemplate now that it would be more than \$200 million that

will have to be fully shown?

Mr. PACKARD. The information that we have, Mr. Chairman, indicates it is very likely to be substantially more than \$200 million. But I would like to say that there are some things about the C-5 program, avionics and some other things, which may be in excess of what is really needed for the required capability. We may be able, if we get into it, to find some ways to reduce this cost without affecting the required capability. We haven't done that yet.

The estimate we have now, as I have indicated, looks like the difference might be in excess of \$640 million. If we can find some ways to tighten up the management and do some things to the program which will reduce the cost, we certainly are going to attempt to do them. We may recommend a settlement of the claims as the best solution. It is just not possible for me to give you any feeling now as

to how much it might be below the \$640 million figure.

Chairman Stennis. I want to emphasize that I am not trying to hold you to any figure here, and I don't think anyone will. This is just

a preliminary briefing.

Mr. Shillito. Mr. Chairman, we might mention and of course figures are going to change somewhat with each passing day, that cash flow for the C-5A program alone for fiscal year 1971, may require that the \$200 million contingency be increased to around [deleted] million. This is something that is being looked at very closely and may change.

Chairman STENNIS. While you are on these negotiations and so forth, is that [deleted] million in keeping with the situation? Should

that be kept classified for the time being?

Mr. Shillito. Yes, sir. Mr. Packard. I think it should.

Mr. Shillito. Yes; very much so.

Chairman Stennis. That is in the Government's interest as well as all parties?

Mr. Shillito. Yes, sir.

Chairman Stennis. All right, my time is just about up.

PREPARED QUESTIONS FROM SENATOR STENNIS

(Questions submitted by Senator Stennis. Answers supplied by the Department of Defense.)

Question. It appears that the Cheyenne expenditures of \$200 for the contractor will be significantly reduced for (1) contract price increase estimated by the Army in the SAR at \$30 million (96-126M); (2) how much the value of the work in process will be determined at by the Government. Can you explain this situation?

Answer. Over the course of the development program, Lockheed has been asked to perform work that was not within the scope of the original development contract. The increase in the SAR "prime contract" figure reflects this additional work. Since the additional payments that Lockheed has received or will receive is for this additional work, the payments will not offset Lockheed losses on either the development or the production contracts.

Prior to the termination of the production contract, Lockheed acquired a considerable amount of inventory and tooling for use in the production program. This inventory and tooling may be of considerable value to the Government in any future production contract. Any decision to acquire such inventory and tooling, or a significant portion of it, would reduce the extent of Lockheed's possible losses under the production contract.

Question. Will the contractor continue to be paid a profit by the Government on the remaining programs while the Government is financing programs that are in trouble?

Answer. The Government has maintained over the years that each contract stands by itself. That is to say, that in general, losses or gains on one contract have no effect on another contract insofar as the Government is concerned. Thus, where the contractor performs the contract effort within the contract price, it will receive a profit. We contemplate no different result in the present situation. However, all of these matters will be considered in seeking a resolution to the present problem.

Question. Is the contractor, to the Air Force's knowledge, now classifying as expenses, items such as work on the L-10 or other projects that were previously or normally could be classified as inventory?

Answer. It is our understanding that Lockheed in its financial reporting has, for the past several years, on the L-1011 aircraft development and related efforts, capitalized (inventoried) its costs for later expensing. However, for tax purposes, the costs have been expensed.

Question.—How much can the \$640 million loss reported to Lockheed on the C-5A contract be reduced through contractor sales of spare parts, et cetera?

Answer. Our current estimate of the cost of new work (initial spares, depot AGE, etc.) on the Lockheed contract is about \$340-\$350 million. There are two aspects of this new work to consider—one the profit amount and the other, the adjustment to the ceiling price. The Air Force position is that the profit amount is the only aspect of two matters to consider. In this regard, a separate profit should be negotiated for each new item. Assuming an average profit of about 10%, this would result in a \$34-\$35 million recovery. Lockheed believes that the basic contract ceiling of 130% should also apply to this new work and, if so applied, could result in a recovery of about \$100 million. This is one of the issues we expect to resolve in working out the overall solution to this whole matter.

Question.—As of July 1969, the Air Force estimated the cost of 115 C-5A's to be \$3.2 billion. What is the current estimate for 81 aircraft?

Answer. The \$3.2 billion estimate for the Lockheed part of the program which was given to Congress in June 1969, was based on the interpretation of the contract most favorable to the Government. The Air Force estimate of what it would cost Lockheed to produce the 115 aircraft was \$3.5 billion.

On the same basis, the Air Force estimates the cost to the Government will be \$2.5 billion for 81 aircraft as compared to the estimate of \$3.2 billion that it will

cost Lockheed to produce these aircraft.

The \$2.5 billion does not include any additional dollars that may be required as a result of settling the contract dispute.

Question.—What was the original delivery schedule as compared to the current schedule for the C-5A?

Answer. A comparison of original vs. current delivery schedule at significant milestones as follows:

Delivery of 1st training aircraft: Original contract_____ June 1969. Current planning_____ December 1969 (actual). Initial operational capability:

Original contract_____ December 1969.

Current planning_____ June 1970.

Delivery of 81st aircraft:

Original contract_____ July 1971.

Current planning_____ January 1972.

The current planning schedule existed at the time the FY 71 budget request was submitted. Since that time, a slippage in deliveries has been confirmed and Initial Operational Capability is now forecast for September 1970 with delivery of the 81st aircraft in July 1972.

PREPARED QUESTIONS FROM SENATOR SMITH

Chairman STENNIS. Senator Smith? Senator Smith. I will supply questions for the record.

(Questions submitted by Senator Smith. Answers supplied by Department of Defense.)

Question. What is the current status of the engineering "fix" for the C-5A wing problem!

Answer. In July 1969, the full scale static test article failed at 125% of design limit load. Weight and G load restrictions were imposed on the fleet to permit continued flight test operations with an adequate safety margin. An urgent program to design and test a fix was instituted. As a result of the load analysis that was conducted, reinforcements were designed for 11 points in each wing. In January 1970, before the fixes had been installed, cracks were discovered in flight test airplane #3. These cracks were in the area already identified as needing reinforcement.

Extensive testing has been accomplished and is continuing. The results to date of the engineering analyses conducted by the contractor and the Air Force are very encouraging. A special panel of NASA, scientific and industry experts has been established by the Scientific Advisory Board to review all of the test data and engineering work that has been done to provide an independent check on the adequacy of the proposed fix. The fix will be installed in the production line starting with aircraft #14 to be delivered in May 1970. A retrofit program for the first 13 airplanes is scheduled to be completed by October 1970.

Question. Included in the fiscal year 1971 authorization request for the C-5A is \$200 million for contingency provisions.

What is the nature of these provisions and what additional amounts will be required in the future?

Answer. The \$200 million is the estimated minimum requirement needed to insure continued production of the C-5A through FY 1971. This amount is in addition to the funds required to fund to the contract ceiling price based on a contractual interpretation most favorable to the Government. Additional funds required beyond FY 1971 will depend on resolution of contractual issues.

Question. Based on your knowledge of the C-5A program currently, what government funding over and above that required by contract will be needed to keep Lockheed's C-5A program on schedule.

Answer. The extent to which the Government may have to fund in excess of that required under Air Force interpretation of the contract to assure delivery of 81 C-5As has not yet been determined.

In attempting to resolve the C-5A financial problem the Air Force is working

closely with the Office of the Secretary of Defense.

BUDGET REQUEST

Chairman STENNIS. Thank you.

Senator Symington?

Senator Symington. I have several questions here the staff has been helpful in getting up, which I apreciate. First, Mr. Secretary, I am very glad you are in on this problem, based on your experience.

Mr. PACKARD. Thank you, Senator. I am not sure I agree with that

completely.

Senator Symington. You point out the impossibility of decision now, on page 7, when you say, "The fiscal year 1971 budget was prepared on the basis of the Air Force's interpretation of the contract with a \$200 million contingency fund added."

From the little I know about it, you will end up needing consider-

ably more than another \$100 million.

Then you say, "Information received in the last few days indicates that even with this additional amount, there will not be sufficient funding to support the C-5A program through the fiscal 1971 budget period. Within the next few days we would expect to determine the total amount required. Additional dollars will also be required for fiscal 1972 to complete the funding."

I think it obvious that it is important for us to have something

more firm than that.
Mr. Packard. Yes.

LIST OF BANKERS INVOLVED

Senator Symington. Before we come to conclusions or recommendations on this problem, I have a few questions. Who are the bankers in this particular case?

Mr. PACKARD. There are 24 bankers. We have the list. Senator Symington. Who is the primary banker?

Mr. Shillito. Actually there is no designated lead or primary banks, Senator. However, recently a committee has been formed by the banks to represent the group. The line of credit across the 24 banks is quite spread, and runs to a maximum of \$30 million. We will supply a list of the bankers for the record.

Senator Symington. Will you supply the details?

Mr. Shillito. Yes, sir; we will. (The information follows:)

LIST OF BANKS EXTENDING CREDIT

Bank of America National Trust and Savings Association. The Bank of California National Association. Bankers Trust Company.

42-060-70-pt. 2-2

The Chase Manhattan Bank. N.A. Chemical Bank. The Citizens and Southern National Bank. Continental Illinois National Bank and Trust Company of Chicago. Crocker-Citizens National Bank. The First National Bank of Atlanta. The First National Bank of Boston. The First National Bank of Chicago. First National City Bank. The Fulton National Bank of Atlanta. Girard Trust Bank. Irving Trust Company. Manufacturers Hanover Trust Company. Mellon National Bank and Trust Company. Morgan Guaranty Trust Company of New York. The Pacific National Bank of Seattle. The Philadelphia National Bank. Security Pacific National Bank. Trust Company of Georgia. United California Bank. Wells Fargo Bank.

COMPOSITION OF COMMITTEE (BANKS) REPRESENTING THE GROUP

Chairman: Mr. Fred J. Leary, Jr., Senior Vice President, Bankers Trust Co. Members: John Breeden, Executive Vice President, Wells Fargo Bank.

James P. Mitchell, Vice President, Chase Manhattan Bank. DeWitt Peterkin, Jr., Executive Vice President, Morgan Guaranty Trust Co. Ronald G. Ross, Vice President, Bank of America.

Robert C. Suhr, Senior Vice President, Continental Illinois National Bank and Trust Company.

DEBENTURE PROTECTION

Mr. PACKARD. I might clarify that, Senator. The banks are all independent banks. There is no lead bank in it. We asked the banks to form a committee that we could deal with, because obviously it is very difficult to deal with 24 separate banks on an issue of this kind.

Senator Symington. Thank you. It is understood that in order to protect the bankers and bond holders, there is a provision in the agreement relating to the debentures issued for Lockheed that the net worth

of the corporation will not go below \$300 million.

In the current unaudited statement the net worth will be down to \$321 million. Do you consider it an obligation of the Department of Defense to protect the debenture agreement in connection with any settlement?

Mr. Packard. We have discussed this question with the bankers, and they understand the severity of this problem. I don't see how we can look at the minimum net worth figure as any obligation on us to support, and I would not intend to. We do have to look at the whole problem, though.

Senator Symington. Would you say how much you consider the net worth of the company can be reduced, and still enable the Department of Defense to receive the defense items already contracted for? That is a difficult question to ask offhand. I wish you would sub-

mit an answer for the record.

Mr. PACKARD. I think, Senator Symington, that question is going to be one that will involve discussions with the bankers and an evaluation of the commercial program. This commercial program, as I have indicated, is going to put an additional financial burden on the company.

The net worth of the company, as you know, is a little above \$300 million. Claims may be up to three times that amount. It is going to be very hard to keep the net worth from getting down to a low figure unless we can find some solution to their problems.

CLAIM JUSTIFICATION

Senator Symington. Thank you. The recent press release of Lockheed states that the corporation wrote off about \$150 million in 1969 on the four programs, in addition to \$140 million prior to 1969. This action, of course, assists in creating a deficit for the year.

Since this item is treated as a loss, and as an expense, how can it at

the same time be treated as a claim?

Mr. PACKARD. The company has written off these amounts. They will obtain some tax credits on the amounts that are written off.

Those will be appropriately considered in connection with the claims. These figures will obviously have to be taken into consideration.

Mr. Shillito. Senator, this is not really a problem—to write things off for tax purposes and still treat them as a claim is frequently done in the business world.

DEBT BREAKDOWN

Senator Symington. In the press release the long term debt of the Lockheed Corp. increased from \$138 million in 1968 to \$336 million in 1969, or about \$200 million. How much of this is attributable to its commercial aircraft operation and how much to the defense contracts?

Mr. PACKARD. I don't know that we can separate that out completely at this time, but I will have an accurate separation of both the commercial and defense resources and the allocation in our consideration. We will provide that for you with our recommendation.

Senator Symington. Do you know if the bankers stipulated that the

loans could only apply to commercial business?

Mr. Packard. We are aware of that question.

Mr. Shillito. This was discussed in some detail. We were quite concerned about this. As you can appreciate, this has gotten to the point now with the bankers where they are quite interested in insuring that the loans apply to Government defense business as well as commercial business.

Mr. PACKARD. Yes, but I think the issue is that they obtained the money from the banks to finance the commercial program.

Mr. Shillito. That is right.

Mr. PACKARD. The banks wanted the total resources of the company behind the loan, and that is obviously a critical factor in this whole matter.

Senator Symington. Thank you.

QUESTION OF PRECEDENT

Mr. Secretary, you of course have no definite proposition to present to the committee today. I would ask, however, if this problem does not create a precedent with respect to the whole method of defense weapons procurement?

Mr. PACKARD. Senator Symington, it not only represents a precedent, but I think it also represents an opportunity to learn how to do these

jobs better in the future, and we are certainly going to keep that very much in front of us.

I am sure you are aware we have spent a good deal of time looking at the whole matter of weapon systems procurement. We have already taken some steps on some contracts which I am confident will help in avoiding a recurrence of this type of thing in the future.

I am not satisfied we have done everything necessary, but certainly I think it is more important for us to be sure that we learn whatever can be learned, and establish procedures that will avoid this kind of

situation in the future.

Senator Symington. I thank you for the answer to those questions. I am on the Joint Economic Committee chaired by Senator Proxmire. When the C-5A came up for the first time before that committee, I went over the contracts in some detail with the then heads of the Air Force; and as a result, figured there might be a chance, so I defended the C-5A contracts in that committee in public hearings.

Now that it has gotten to this point, it puts me in a bit of a crack, and so I am very interested in how you work it out and I do thank you for your frank answers this morning. I think if we will be frank with each other, we have the chance of working this out, that is

greater than if we are not.

Mr. Packard. Senator, I certainly welcome any counsel you might

Senator Symington. I have no advice to give. Apparently the company is rapidly going into receivership in the normal concept of the term. As I see it, just off the top of my head, what is done will depend upon that actuality as against what you decide, and then the committee decides is the public need. Is that correct as you see it?

Mr. Packard. I think it is certainly very close to that kind of a situation. Whether we can avoid actual receivership or whether receivership would be a better course of action is one of the questions we are

going to have to address.

Senator Symington. Thank you, Mr. Secretary.

Thank you, Mr. Chairman.

Chairman Stennis. Thank you, Senator. I am going to call on you in just a second, Senator Dominick. I want to ask one question now.

C-5A CONTRACT PROBLEMS

The way this thing sizes up to me, Mr. Secretary, you have a product, the C-5A, that I understand is good, is that right?

Mr. Packard. Yes, Mr. Chairman. There are a few technical prob-

lems. None of these at this time appear to be too troublesome.

Chairman Stennis. Apparently it is good. That shows good management of a kind. They have made no money. There is no profit involved. You, and they agree there.

Mr. Packard. Yes.

Chairman Stennis. Still there is this enormous sum of money. Now what is the trouble? It makes me think that other kinds of contracts are necessary, unless there has been bad management. What is your response to that?

Mr. Packard. Mr. Chairman, what you say certainly has some truth to it. There are a number of problems that we have found in a good many other contracts. Many problems are apparent in this particular one.

One of them is that we get what we think is competition in the early stages of these total package procurement programs. There is a great incentive for these firms to make low estimates. You might call

it "buying in," or you might simply call it overoptimism.

They were, without any question, overly optimistic in what this would cost them at the beginning of the program. This points out, it seems to me, one of the problems that we have had in many of these matters in the past.

In a job this big, where you are developing a new item, it is almost impossible to establish with certainty what the production price is going to be until the development is far enough along to know what

the problems really are.

We have restructured the F-15 contract in an attempt to put in milestones so that we do not build up substantial production obligations until we are down the road on development. It is not practical in most cases to have a complete separation of a "fly before you buy." But, we believe we can structure the contract so that the development is far enough along that most of the uncertainties are out of it, and the costs are known, before we begin to build up large production liabilities.

That is one of the important problems. There is another factor with

respect to the C-5 contract which I think is important.

I think the Air Force went all out to put every conceivable feature in it that they would like to have. Some of these features, in my view, are not really necessary, and we could have had a lower cost design if more attention had been given to the features that were put in this aircraft. For instance, we have a terrain-following radar in this plane. Now that would be a nice thing to have, but it is highly questionable in my mind whether you need terrain-following radar in a transport of this size.

These are some of the kinds of issues we have addressed in the F-15 program. We asked the Air Force to sit down and take a hard look at all the features of the F-15 and see if we really need everything. We wanted to eliminate at the very beginning of the program those things which are not worth what they are going to cost.

I think the answer to that question, Mr. Chairman, is that this C-5 contract could have been managed at a lower cost. What that cost

would have been I can't predict.

Chairman Stennis. All right, I think that explanation by you is

worth something. Senator Dominick?

Senator Dominick. Mr. Secretary, I am going to ask a number of questions for the record here which I think may be of some help in our consideration.

PRODUCTION DELIVERY SCHEDULE OF C-5A

First of all, how many C-5's have been produced and delivered and accepted?

Mr. Shillito. Eleven have been produced, but only three are operational, Senator.

Senator Dominick. And over how long a time span is it anticipated

that the other 70 would be delivered?

Mr. PACKARD. This question has not been finally resolved. The current planning schedule calls for a delivery rate of three per month starting about now. It is apparent that Lockheed probably cannot meet that delivery schedule, and there may be some advantage in actually scheduling them out at a lower rate so that the deliveries would run two to three per month. Under this schedule deliveries would be completed in July 1972, however, the final delivery date depends upon what delivery schedule is finally determined.

Senator Dominick. Is it feasible that the production of these air-

craft could proceed under another conrtactor?

Mr. Packard. Under another contract?

Senator Dominick. Contractor.

Mr. PACKARD. It would be possible to bring in another contractor and let that contractor operate these facilities. To transfer these facilities physically to some other location would, I think, be very difficult if not impossible.

Senator DOMINICK. But another contractor in theory at least would be able to move into the plant and do the work with the equipment

that they have got.

Mr. PACKARD. Yes; I would think so. Another contractor or some different kind of a management control could be considered.

IN-HOUSE ESTIMATE

Senator Dominick. I think I have asked this question before, and I don't remember the answer, but are there no in-house estimates, engineers estimates made prior to acceptance of the contract so that we have some idea of whether the people are bidding within reason?

Mr. PACKARD. Senator Dominick, there are some in-house estimates but I have been very troubled since I have been here by these estimates

because they have not been very realistic.

The fact, I think, is that there has been some tendency for the service estimates to be on the low side. We have just recently set up what we hope will be a better capability of making estimates on these kinds of programs in advance. In saying this I want to qualify my statement, because it is very difficult to make good estimates in a large development program on the production cost of an item that has not yet gone through development.

You can make parametric estimates, you can make some judgments and so forth, but it is really very difficult to get a precise production cost estimate until you have the development far enough along to

know what you are going to produce.

LOCKHEED CLAIM

Senator Dominick. According to my brief review of your statement here, it looks like Lockheed is claiming \$1,065 million in amounts owed to them. Is that approximately right?

Mr. PACKARD. Yes. The total is slightly in excess of \$1 billion. Senator Dominick. I just have a totally Wizard of Oz feeling as to how you can get up into those amounts without having something settled. How could you possibly be \$1 billion out of gear without having some kind of settlement made before this time? This has been going on since 1961 or 1962, hasn't it?

Mr. PACKARD. I think the answer in part is that in practice, the Department has somehow found ways to bail these fellows out. They thought they were going to get bailed out here, too. This is the reason,

if you want to reduce it to a simple answer.

Senator Dominick. Thank you.

Chairman STENNIS. Senator Cannon? Senator Cannon. Thank you, Mr. Chairman.

ALTERNATIVE

Mr. Secretary, I understand you don't want to suggest an alternative between those that you mentioned at this time. How soon do you anticipate that you will be able to come up with a recommended alternative?

Mr. PACKARD. Senator Cannon, it is difficult for me to give you any precise estimate. One of the problems is that until we received this letter from Lockheed we did not have the opportunity to get in and obtain all of the facts. It is only recently that I felt there was enough cause to talk with the bankers. I am very well aware of the fact that the sooner we can come up with a recommended solution that is acceptable, the better off we are going to be. I think it is going to take at the very least several months. It may take longer than that. I just can't give you a very good answer to that question.

Senator Cannon. Assuming that it does take several months, are you going to be able to keep Lockheed in business on these contracts that they have in that interim period, or is their cashflow going to get

to such a position that you won't be able to?

Mr. Packard. I have outlined in my statement here, perhaps I did not do so clearly enough, that we have been working with them on their short term cash flow problem. There are ways to meet their cash flow needs without requiring any special action until late calendar 1970, so that we have several months' leeway. We certainly intend to keep Lockheed going during this period and we will do whatever is needed, I believe we can do this with the means we have available.

Senator Cannon. So that you are not under the pressure of time to try to decide which alternative you want to follow?

Mr. Shillito. We might be faced, Senator, with breaking the solution into two parts—a near term and a long term, one being what we might do insofar as the fiscal year 1971 budget is concerned. However, there may be something different from that which is in the budget now.

Mr. PACKARD. This also involves the need for us to get the bankers to go along on a short-term solution, which we think they will do. Our preliminary discussions with them indicate that they probably will. I can't assure you that they will, however, because this is part of the

problem also.

PRESENT BANKING ARRANGEMENTS

Senator Cannon. I was going to ask you next what are the existing

arrangements with the banks?

Mr. PACKARD. The company has a \$400 million line of credit with these 24 banks. I believe there is a 10-percent compensating balance involved, which leaves them with \$360 million available. They had not, the last time I had looked at it, used all of this credit from the banks, but they will be doing so shortly. Frankly I think the bankers have no choice but to work with us, and I think they will do so.

Mr. Shillito. It would appear that by May they will be up to the

\$400 million.

Senator Cannon. At least at the present time they are not under a

current demand position.

Mr. PACKARD. No. We felt it was very important to get the bankers in. As a matter of fact the bankers did not know the seriousness of this situation until we got them in and talked to them last week.

PROCEDURE OF CLAIM ADJUDICATION

Senator Cannon. Assume that the Government determined that it should provide \$600 million over and above existing contracts. What actions could the Government take then to recover those funds? Would it just simply sit pending litigation and determination, assuming that the determination was less than that amount, what would be your resources?

Mr. PACKARD. If you follow the course of allowing the established procedures to adjudicate these claims through the Armed Services Board of Contract Appeals and beyond that, the courts, and assuming the Government prevails, the amounts involved would be very difficult for the company to repay, except over a very long period

of time. I don't know how you would do that.

They have generated a net worth of more than \$300 million over a period of years. How they are going to generate \$1 billion out of future profits, is very difficult to determine. I think the facts that we are going to have to assume are that we can't recover it. I don't see at this time how it can be done. We might recover part of it.

Mr. Shillito. This would not be the case if they were successful

in prosecuting the claims or a significant part of them.

Mr. PACKARD. If they are successful with the claims, then they are all right. We simply have an obligation which we just had not recognized.

Senator Cannon. But if they should lose, then you would in effect

just have to say well, these cost us more than we agreed to pay.

Mr. Shillito. That is right.

Mr. PACKARD. There are numerous in-between positions. There are different considerations on each contract.

CLAIMS BOARD ESTABLISHMENT

Senator Cannon. Is there a possibility that the Board could speed up their processes, so that this matter could come to an early determination?

Mr. PACKARD. Yes. We have requested that this be done. We will do whatever we can to encourage the appeals board to accelerate its action.

I think again in view of the magnitude and complexity of the problem, even with an accelerated action, it is not likely the appeals board could come up with a solution on the C-5A problem, for example,

much before early next year.

Now, as to the Navy claims, these are in the process of being negotiated now. Some of those Navy claims will be settled or offers of settlement will be made under established procedures. The Navy claims, I think, will be paid during this period. The SRAM situation involved a fixed price subcontract. We understand the subcontract may be amended to increase the ceiling price to about \$26 million. It is my view at this time that the company has a very weak claim on the balance. However, this is not a substantial amount in comparison with the other claims.

The SRAM claim is for \$50 million. On the Cheyenne, the claim really hinges on whether the Army was right in canceling the production part of the contract for default. This is perhaps a simpler issue

and perhaps could be determined earlier.

If it were found that the Army was not correct in terminating that contract for default, then it would be treated as if it were terminated for convenience of the Government. The Government would then be obligated to pay whatever amounts the company had expended on the contract.

Each of these issues has a different aspect, and we may not recommend the same solution for each one of the problems. We have to look at the matter in an overall context.

MAGNITUDE OF PROBLEMS

Senator DOMINICK. Howard, could you yield for one question?

Senator Cannon. Yes, I yield.

Senator Dominics. We have only been talking about Lockheed. It is my understanding there are other companies that are also in real bad trouble. Is this true?

Mr. PACKARD. We are not aware of other companies that are in trouble as serious as this. The fact is that with the cutback in our defense spending, it is probably correct to say that the whole aerospace industry will have more capacity than we are likely to need for defense products over the next few years. That may be a serious problem.

Many of these companies are also supplying commercial aircraft. The airline business, as I think you know, is in financial difficulty. It appears that the airlines are not generating enough cash to pay for

some of the planes that they have ordered.

There are going to be some serious problems in a number of companies. I do not know of any that have this serious a problem with the Defense Department. However, with the thousands of contracts and the present situation prevailing, there are probably some problems.

ANALYSIS OF CONTRACT SETUP

Senator Cannon. As I analyze this letter, it seems they contend that in each of these systems there were items that occurred that were beyond the state of the art at that time that were unanticipated. Do you agree with that position, or is that a correct analysis of it?

Mr. Packard. I don't agree with that completely. I think there were some uncertainties. It seems to me that the company itself had a

responsibility to evaluate those uncertainties.

For example, they contend in the SRAM program that it was economically impossible to do what was requested of them. We have not fully evaluated that question. It seems to me that it is desirable to take the position that when we get a firm bid price from a company we can expect them to know enough about the uncertainties involved in making that item. However, some of these programs may be too complex for that to be accomplished.

Senator Cannon. Are you far enough along at this point to come to a determination that this is the wrong type of a contract to pursue

in contractual obligations of this magnitude?

Mr. Packard. Senator Cannon, I personally have come to the conclusion that this total package procurement concept, on a program which has a substantial development problem, is an entirely unsatisfactory approach. As I have indicated, we are working on ways to come up with what we think will be better contracting procedures.

I can't promise you we are going to solve all of these problems, but I think we have learned enough during this past year to realize that this is not a very satisfactory way to handle this kind of a program.

Senator Cannon. Thank you, Mr. Chairman. Chairman Stennis. Thank you, Senator.

Senator Murphy.

MILITARY-INDUSTRIAL COMPLEX QUESTIONED

Senator Murphy. Mr. Chairman, I am convinced as are Senator Cannon and Senator Dominick that this system has produced this catastrophe. I think it would be safe to assume that the further you dig the more of these you are bound to find, becaues the system has quite obviously been wrong. Where the blame should be placed is not of concern. The change is immediate consideration.

Two things interest me. Do you think that the attack that has been generated over the last year or year and a half on the so-called military-industrial complex has had any bearing on the result that we

find here?

Mr. Packard. It is hard for me to give you a good answer to that question. Certainly the attack on the so-called military-industrial complex has caused much greater public attention to be focused on these programs. Some of these cases, perhaps, might have been settled by negotiation in a different environment in the past. I don't think that would necessarily have been the right solution for every case. I think that we just have to face up to these problems and see if we can find better ways to handle them.

Senator MURPHY. This is a condition that apparently—I am new on the Committee, but it seems that this has been growing into the

system over the years.

For instance, the attempt on the part of the Department of Defense and the different military establishments, to kid themselves that something is only going to cost \$1 when they know darn well it is going to cost \$2.50, and this seems to be what has happened here—the buy-ins which we talked obut. It is a very unhealthy and uncertain

way to do business. I am of course terribly concerned about this because I am thinking of it from the standpoint of the number of jobs provided in my community. My community has already suffered greatly with some of the cutbacks, and programs that have been scrubbed. Consideration must also be given to the national security.

What do we actually need out of this? Once it is made certain that the business procedures are not wasteful, the fact as to mistakes with the figures are really quite unimportant. The important thing is that the taxpayer and the country get at proper cost what they are paying

for.

I am most interested in the experience we had with the tank, and with the reassessment of some of the equipment on the tank, which I believe, thanks to your suggestions, turned out to be a great saving. This practice of overloading, putting everything that the state of the art can provide, whether it is needed or not is bad, and perhaps such a reassessment of some equipment can provide relief in this matter.

Mr. Packard. Senator Murphy, we have put a great deal of time and effort in considering this problem during the last year. We have had a number of meetings with people from industry and with our own people. Steps have already been taken which I believe are in the right direction. I certainly do not want to say to you that we have all the problems solved and that we will not find, a couple of years from now, that we have overlooked something.

I think we have to recognize that these are big and complicated programs. They do not yield to the simple solution that you can handle

with an ordinary, small commercial transaction.

Senator MURPHY. I would like to say that I am pleased that we have a man of your experience and capabilities, and I am certain that if there is to be a way found out of this dilemma, that you and your staff will find it. I would like to congratulate you for the report that you have made this morning, particularly in view of the short period of time that you have had to get under the other areas, rather than the simple area of the Department of Defense. I hope we can continue these meetings and find a way out of this.

Thank you very much, Mr. Chairman.

Chairman STENNIS. Thank you, Senator. Senator Young.

Senator Young. Thank you, Mr. Cannon. I would rather yield at the present time to Senator Goldwater, who knows so much more about these matters than I do.

Chairman Stennis. All right, thank you, Senator. Senator Goldwater.

Senator Goldwater. Yes, Mr. Chairman. I first want to thank you for allowing my son, who represents the 27th District of California, where Lockheed is located, to be present. He was most anxious to hear

this presentation.

Chairman Stennis. I was going to tell the committee about that, but he was not here when we started. Senator Goldwater said yesterday that Congressman Goldwater's district includes the home office of this company. We extend that courtesy to all Members of the House, and to any Senators. We will be glad to have you come back, Congressman Goldwater, especially as it involves your district. All right, Senator Goldwater.

INTEREST RATE

Senator GOLDWATER. Mr. Packard, on this \$400 million line of credit, what interest are you paying?

Mr. PACKARD. The prime commercial rate is currently 8.5 percent.

Mr. Shillito. They have been exploring other credit over the \$400 million and interest rates in excess of 8.5 percent are being considered.

Mr. PACKARD. With the compensating balance required this puts the effective interest cost at about 10 percent.

BOARD OF CONTRACT APPEALS

Senator Goldwater. On page 3 you say "Lockheed has appealed this default termination to the Armed Services Board of Contract Appeals. A decision is not expected before the first of next year at the very earliest."

This is hard for me to believe, that it would would take this outfit a year to decide whether Lockheed was right or wrong in this. Is this

typical of the way they act?

Mr. PACKARD. The Board, of course, has a number of matters to consider. They consider them very thoroughly, and we think it is important that they do consider them thoroughly. We have emphasized the urgency of this matter. Whether they can reach a judgment sooner than that I don't know, but we are giving them all the encour-

agement we can to move ahead with their determination.

Mr. Shillito. I think we should mention here, Senator Goldwater, that in the embryo stages of matters that go to the Armed Services Board of Contract Appeals, there is a significant time period for discovery. Right now this discovery process is being pursued in the Cheyenne matter by both parties. It appears that a considerable amount of time will be required in order to develop the evidence necessary to bring the case before the Board for a formal hearing. It does take time.

COST OVERRUNS

Senator GOLDWATER. Is is true that all large contracts that run for more than 1 year have had overruns?

Mr. PACKARD. I can't say that for sure, but it is probably true. Let us look at the record and see if we can supply a more determinative answer to that question.

(The information follows:)

The committee receives periodically from the Department of Defense Selected Acquisition Reports on major programs which set forth management information, including program cost data. By letter of March 2, 1970 from the Deputy Secretary of Defense, 27 such reports were forwarded to the chairman of the committee reflecting program status as of December 31, 1969. By letter of March 13, 1970, an additional group of four reports were transmitted to the Chairman.

Based on information contained in SAR reports of December 31, 1969, all programs involving contracts awarded more than 1 year before March 10, 1970,

showed some cost growth.

RESPONSIBILITY FOR OVERRUNS

Senator Goldwater. I know inflation is probably the major part of this reason, but if you could give your opinion as to who is really at fault in this whole area of overrun, I think it would be helpful.

Mr. Shillito. Most programs and contracts have no such problem. However, a significant percentage of the large programs have experienced cost growth.

Senator GOLDWATER. This has been true in the last 5 years, is that

right?

Mr. Shillito. It seems so.

Mr. Packard. We have a number of contracts that are within the ceiling. One of the difficulties is that the type of contract used for total package procurements provides for a target price and a ceiling price. This ceiling price is in some cases 50 percent above the target price, and that is quite a range. I think it would be hard to find many contracts that are completed at the target price. We are doing the best we can to monitor very carefully programs such as the F-14, S-3A and the others to make sure that we take action before they go much beyond the target.

Senator GOLDWATER. I wonder if you could supply for the record the state of other contracts of not less than comparable size but what you

would consider large contracts.

Mr. PACKARD. We have selected acquisition reports, Senator Goldwater, which cover the major programs. I think perhaps that might be a source.

Senator GOLDWATER. You do have those?

Mr. Packard. Yes.

Senator GOLDWATER. Are those available?

Mr. PACKARD. Those are available to the committee.

Mr. Shillito. They are submitted each quarter to your committee. Mr. Packard. Yes. They will give you an overview of the situation.

NEED FOR C-5A

Senator Goldwater. One more question, Mr. Chairman, that gets to the need of particularly the C-5. Is the Defense Department still con-

vinced that we have to have this airplane?

Mr. Packard. The answer to that is yes. We think this airplane will provide a very important and necessary capability for our future defense requirements. We have, as I think you know, this year been working through the National Security Council to try and determine where the long-term interests of the country are and what defense capability is needed in the future. The Nixon doctrine, which involves a much lower level of commitment of ground forces in the Asian theater is an example of the type of policies this review has helped generate.

This all points to the desirability of having more mobility in our forces. There has been a big increase in air mobility during the past year. We considered this whole matter in determining that we need not buy more than 81 C-5 aircraft. We do need 81 aircraft, as that is an

important element in our future defense posture.

Senator Goldwater. In closing, Mr. Chairman, I think if these committees can work this problem out with Lockheed, that they are going to be able to take care of it themselves. I think this C-5A has tremendous domestic and commercial potential. I think it can completely revolutionize our system of freight handling in this country and around the world, and I have the feeling as I told the Lockheed people that they purposely went low on this knowing that they would have a great use for this airplane.

I think once you get it straightened out, it is going to stay straight-

ened out.

Mr. PACKARD. I think what you say is true in the long run. This large transport capability will have many important applications. I will remind you though that there is the Boeing 747 which also has a capability in this area. Two other planes are coming along, and whether the short term commercial market will absorb this capacity in time to really help is questionable.

In the long term there is no doubt that this is going to be a very important capability, but whether the short term demand will help us over the hump I don't know. We talked about that with Lockheed. They feel it can, but even on a production basis, you are talking about a cost of \$20 to \$25 million per airplane. This poses a problem of finencing carries in the appears according to the property according

financing cargo carriers in the present economic environment.

Senator Goldwater. That is all I have, Mr. Chairman.

Chairman Stennis. Thank you, Senator. Senator McIntyre.

Senator McIntyre. Mr. Chairman, may I yield since I was late, to Senator Byrd and then Senator Schweiker, provided I have a chance to ask one or two questions?

Chairman STENNIS. Without objection that will be done. Senator

Byrd.

ESTIMATED LOSS TO LOCKHEED

Senator Byrd. Thank you, Mr. Chairman. Thank you, Senator McIntyre.

Mr. Packard, in your statement you say "The Air Force estimates the loss to Lockheed exceeding \$640 million."

Mr. PACKARD. That is on the C-5A.

Senator Byrd. On the C-5A.

Mr. Packard. Yes.

Senator Byrd. Nine months ago when the Air Force testified before the committee you put the estimated loss at \$285 million, less than

half of this figure of \$640 million.

Mr. PACKARD. I think the difference, Senator Byrd, is that we have finally been able to get in and get a much better evaluation of the figures. As I recall that testimony, I don't know whether that was the Lockheed estimate or the Air Force estimate, but they just had not really looked at the problem at that time.

Senator Byrd. That was the Air Force estimate. The Lockheed estimate was a loss of \$13 million. Now does Lockheed still maintain it

will lose only \$13 million ?

Mr. Packard. Lockheed maintains it will lose nothing or some nominal amount, if the determination is in their favor with respect to the dispute that is involved. The contract says that they can reprice the last buy and, in effect, make up for a part or all of the loss on the previous buys. This is the question.

Mr. Shillito. Senator, I think the \$285 million estimate was on 115 aircraft. That is what makes it additionally complicated, because the \$640 million estimate is in connection with the purchase of 81 aircraft.

Senator Byrd. \$640 million applies to?
Mr. Shillito. It applies to 81 aircraft.

Senator Byrd. To 81 aircraft?

Mr. Shillito. Yes, sir.

Senator Byrn. The \$285 million is based on using 115 aircraft?

Mr. Shillito. Yes, sir.

Senator Byrd. Have you given up the idea of using 115 aircraft?

Mr. PACKARD. Yes, we have given up the idea of procuring 115 aircraft.

Senator Byrd. So it is your intention not to go beyond the 81?

Mr. Shillito. At the present time it is our intention not to go beyond

81 aircraft.

Senator Byrd. So far as the Government's part in the financing of this, I note in reading the testimony of last June that through May 30, 1961, Lockheed expended on the C-5A \$1.570 billion, and the Government had paid Lockheed on its contract, C-5A contract, \$1.520 billion, so Lockheed had received from the Government 97 cents on every dollar it expended.

Now, I assume that the same thing applies from May 30 on up to

this point. Do we have the figures say through February?

Mr. Packard. We can get those figures for you.

Senator Byrn. Will you supply that for the record.

Mr. Packard. We will, Senator Byrd.

(The information follows:)

Actual progress payments to Lockheed through February 1970 totaled \$2.038 billion. Lockheed expenditures on the C-5 program through February 1970 totaled \$2.114 billion.

AMOUNT PAID TO LOCKHEED

Senator Symington. Would the Senator yield?

Senator Byrd. I will be glad to yield.

Senator Symington. That is a very good question, Mr. Secretary.

In general is it correct?

Mr. PACKARD. In general this is correct. We have utilized our progress payment flexibility to the extent necessary to keep the program going, but have kept it below actual costs. We are just about at the end of the line on this procedure.

Senator Symington. Thank you.

Mr. Shillito. The latest number we have, Senator, is about \$2.038 billion, that has been paid Lockheed.

Senator Byrd. Through what?

Mr. Shillito. That runs through the end of February.

Senator Byrd. \$2 billion?

Mr. Shillino. \$2.038 billion paid Lockheed through the end of February.

PAYMENT OF BILLS

Senator Byrn. What this suggests to me is that Lockheed's financial difficulty is not due to the Government not paying its bills which I gathered from the news reports, although that was one problem, but you are paying 97 or 98 cents on the dollar, and you have right from the beginning.

Mr. PACKARD. That is correct on the C-5A contract.

Senator Byrd. That is what I am speaking of, the C-5A contract. Mr. Packard. Yes. On the C-5A contract we have paid almost everything they have expended so far. On the ship contracts, on the SRAM and the Cheyenne, it is a different matter.

OPERATIONAL AIRCRAFT

Senator Byrd. I was dealing only with the C-5A. Now in reply to Senator Dominick's question, you said that 11 C-5A's have been delivered. I assume you mean 11 production.

Mr. PACKARD. Is that the production unit?

Colonel Rutter. A total of 11 aircraft, 3 operational and eight in the test program. Eventually, the test aircraft will be reconfigured for the operational inventory.

Senator Byrd. I am not clear as to your answer now. Are there 11

operational or production aircraft?

Colonel Rurrer. No. sir; there are three operational aircraft.

Senator Byrd. Then the answer to Senator Dominick's question

should be eight instead of 11, should it not?

Mr. PACKARD. As Colonel Rutter explained, only three aircraft of the 11 already produced are operational. The remaining eight are in the test program.

Senator Byrd. The number you have available for operational

purposes is eight?

Colonel RUTTER. Three.

Senator Byrd. Now we are getting somewhere. It was zero last June and now it is three operational, so we have gotten a total of three aircraft from June up to this point.

Mr. Shillito. Three operational aircraft. Senator Byrd. Three operational aircraft.

Mr. Shillito. That is right.

PRODUCTION SCHEDULE PENALTY

Senator Byrn. The testimony last year was that after July 1 if the company was behind schedule there would be a penalty. Has the

penalty been applied?

Mr. PACKARD. The penalty has not been applied. That penalty is involved in our consideration of this whole matter. As I indicated, the schedule called for delivery of three a month. They are not able to meet that schedule, and I think it might be advisable to reschedule a delivery of two per month. As you know, we had a wing-crack problem and that has slowed some things up. There are other minor technical matters.

Senator Byrd. The three per month, that was to begin last July 1? Colonel Rutter. The contract schedule calls for delivery of the first operational aircraft last June. Our latest planning schedule calls for two a month starting in December of 1969. Essentially one a month through the summer of 1969, two a month starting in December and three a month in April of 1970.

Senator Byrd. The testimony last June was that unless the aircraft were supplied by July 1, which it was anticipated would not be done, they would then be in default. They were not being in conformity with

their contract, is that not correct?

Mr. PACKARD. Yes, sir; that is correct. This is another one of the items under this contract to consider. There are a number of matters like that.

Senator Byrd. Thank you, Mr. Secretary. Thank you, Mr. Chairman.

Chairman Stennis. Thank you, Senator. Senator Schweiker.

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RECEIVERSHIP PROCEDURE

Senator Schweiker. Thank you, Mr. Chairman. Mr. Secretary, to sum up what I think you told Senator Byrd, we have put \$2 billion into the program so far on the C-5A for which we have three operating aircraft. If the company were to go into receivership at that point, that would be the present picture; is that correct?

Mr. PACKARD. This is the present picture: if they went into receivership we would try to work out some way by which the production

would be continued under some management control.

Senator Schweiker. Parts, and so forth.

Mr. PACKARD. We would try to salvage what we can.

Senator Schweiker. Suppose we did nothing. Suppose the Government did nothing in this case. In your estimation, from talking to the bankers, how long would it be before Lockheed would be in receivership? Suppose we decided to just let the chips fall the way they are right now?

Mr. PACKARD. I would not want to make a very precise estimate, but I think if we simply said right now we are not going to do anything, it would not be very long before they were in receivership.

Senator Schweiker. So it is that critical?

Mr. PACKARD. It is at a very critical point, yes.

CONTINGENCY FUND SOURCE

Senator Schweiker. The \$200 million contingency we are talking about, it that from this present fiscal year budget?

Mr. PACKARD. That is in the fiscal year 1971 budget request.

Senator Schweiker. In the request?

Mr. PACKARD. In the request.

Senator Schweiker. Not in the past budget?

Mr. PACKARD. It is not in the past budget.

Senator Schweiker. So it is \$200 million contingency in the new budget plus \$544 million regular?

Mr. Shillion. That is included in the \$544 million requested for

the C-5 in fiscal year 1971.

Mr. PACKARD. The \$544 million figure includes the \$200 million contingency.

Senator Schweiker. It includes that?

Mr. PACKARD. Yes; the \$200 million was the estimate of what was needed to provide the cash flow to get through the fiscal year 1971 budget period. As was brought out here earlier it looks now as though that may not be enough to meet the cash flow requirements unless we can take some steps which will reduce the requirements by way of scheduling or other action.

Senator Schweiker. The news accounts say that the stockholders' investment in Lockheed is \$321 million. How accurate it is I don't know.

Mr. Shillito. Pretty close to right.

GOVERNMENT CONTROL

Senator Schweiker. So if we would decide to put some financing in there of the amount we were talking about, and I realize this is very speculative, we would be putting as much, or probably more,

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money into the company than the stockholders have in the company; is that what I understand?

Mr. PACKARD. Yes, but I think you realize that this money would not benefit the stockholders except to the extent it kept Lockheed

assets from diminishing to nothing.

Senator Schweiker. But for all practical purposes, it would come under Government control—Government operations— if we are going to put that kind of money in.

Now, one of the points brought out in the news article says, "In a sense the major Defense firms own little, but their managerial skills

and their claims to pools of engineering talents."

It goes on to point out that at the Marietta operation something like 41 percent of the financing of the operation there, the capital investment, is Government-controlled. That I do not know. The point is: Are we buying managerial skill? Isn't that where we find ourselves in this case?

Mr. PACKARD. I think that is a reasonable conclusion, Senator.

TOTAL PROCUREMENT

Senator Schweiker. Regarding the quarterly reporting system, Mr. Secretary, I realize that, until the letter came in, we did not realize that the situation was quite so acute. You answered this to some extent to Senator Dominick. Did we have any indication under our reporting system at all as to the estimates that were going out? What was the last estimate on this system that was filed here with the committee?

Mr. PACKARD. The last SAR report was transmitted to the committee on March 2, 1970. I do not have those figures handy. The problem has been the resolution of these claims. I do not know that the SAR report would shed any more light on the subject than we have through these other investigations, but the SAR will have the latest figures.

Senator Schweiker. What I am concerned about is: suppose the Government would decide to put \$200 or \$300 million dollars or more in. What kind of real assurance do we have that we have only seen 50

percent of the iceberg at this point?

In other words, now all of a sudden we have discovered X percent

of the iceberg.

In view of our inability to perceive the iceberg in toto, what kind of assurance could we really have that we are not buying but half a loaf again, and the other half a loaf is going to come due in about 6 more months.

Mr. PACKARD. Senator, that is one of the very important questions

that has to be addressed in this matter.

You see, the concept of the total package procurement was that we were going to depend upon the managerial ability of the company and not provide detailed day to day supervision of this management by the Government.

Under these conditions, we will have to recommend procedures that assure that any money provided is applied to things that we are going to benefit from. I would certainly not want to recommend any solutions that I felt did not have adequate controls to assure that the Government's interests are protected.

I cannot tell you now what those would be.

Senator Schweiker. I realize that.

Mr. PACKARD. But I can assure you there are such controls and they would have to be utilized.

PRODUCTION PRACTICES

Senator Schweiker. One of the problems that has concerned me in terms of our whole military procurement approach is that we seem to put into production a lot of things that really have not been researched and developed to the point where they are ready. The result is that we buy long-leadtime items. The Defense Department comes to this committee, and asks permission to buy long-leadtime items. We think we are doing the service a favor by giving them this long-leadtime item. I really question now whether we are. If we have not researched and developed a product before we put it in production, aren't we really paying a high penalty for long-leadtime items, as in the C-5A case, for which I am sure we bought long-leadtime items, and other areas where we have structural failures and have to go back and revamp the whole production line?

In other words, what I am getting at, isn't the whole basis of this cost overrun problem really the fact that we are too much in a hurry to put a product into production before it is really sound, either financially or performancewise? Isn't that part of the problem here?

Mr. PACKARD. I have spent a good deal of time looking at that whole question on an overall basis in the Department during the last year. It is one of the problems which crops up in frankly almost every program we have examined. There are a number of steps that we have already taken which we think will help this matter.

In the first place, we have an advanced development phase. There is continued pressure to move from the advanced development phase

into engineering or operational development.

We have set up a procedure requiring a full-scale review before a program moves out of the advanced development phase. This is done so that we can determine whether the advanced development phase has shaken out, to the extent possible, the important technical uncertainties.

I was at Raytheon last week looking at the SAM-D program which has been continued in the advanced development phase. It has been

a good thing to have done that.

The second thing we have done is to structure the development phase of the program so that we have achievement milestones rather than arbitrary dates which determine whether we will be able to move ahead with production options. We have structured the transfer from development to production so that these achievement milestones must be accomplished before we get very far into production.

Now these achievement milestones are related to advance leadtime items. They are related to the rate at which you build up production investment. It is not possible in most cases to make an absolute clean

cut between development and production.

Senator Symington. An absolute what?

Mr. PACKARD. An absolute clean cut between development and production.

One of the problems, for example, is that we would like to have the final development models produced on production tooling. That is the only way you are sure that they will produce the desired final product, thus, it is desirable to have a limited amount of production tooling in the development phase.

On the F-15 contract we addressed this problem and we have kept the production planning and the long leadtime at a low level, not at a zero level. The Government's commitment in terms of financial involvement is very low until we have actually demonstrated perform-

ance of these milestones.

Now I cannot assure you that we have selected these milestones precisely right, but we are trying to set up every program now on a basis that is not tied to a rigid calendar timetable. We are trying to use a "milestone" approach to scheduling.

Senator Schweiker. Performance?

Mr. PACKARD. Performance milestones. Again, let me emphasize it is not feasible under these big programs to go to a complete "fly before you buy" concept. You could do it, but we anticipate it would be too expensive.

Ideally you would like to have at least two contractors each build an aircraft and fly them in competition first and then go into production. We have looked at that, and it just turns out that on these big

programs it is not feasible.

As I see the problem, what we need in the final analysis is better contractor management of these programs, as well as better manage-

ment by ourselves.

One of the things that has happened is that managers have been put in the job for a couple of years and then rotated. When a new manager gets in there, he has to learn what the program is all about. We have the services now all working on ways in which they can get the best managers assigned to the big programs and leave them there long enough so they can get the job done properly.

They can rotate if they come to a point in the program which is

appropriate for doing that.

Again on the F-15 program, the project manager was given the assignment with the understanding that he was not going to be rotated. He was going to stay with the job and he was also given a charter so that he could select his team and keep them with him without regard to the normal rotational schedule. So we are looking at these problems, and I think we have made some progress in the way they are managed, but again I want to qualify it by saying these are complicated matters and I cannot assure you that we have not overlooked something.

PERSONNEL REQUIREMENTS

Senator Schweiker. Should we be using civilians with an expert background for this managerial job, as opposed to military career people, who may not be properly trained for this work?

Mr. PACKARD. We will be using both.

Let me say there are some good military managers. There are some real professionals in the military services that are in the management area; but one of the things we have to do is to change the environment so that the project manager's route is a good route to advancement in the services. This way, a man can get to the top by being a

manager of a program as well as by being a battlefield commander. While this is not simple, because the services have some other problems involved here, they are all responsive to this, and are working on it.

It has been my experience whenever you have a program in trouble you should go right back to the man that is managing it. We are putting some emphasis on this, and we are identifying the fellow who is managing it so we know who is responsible.

Senator Schweiker. Thank you, Mr. Chairman.

Chairman Stennis. Thank you.

Under the arrangements that brings us to Senator McIntyre.

WIDESPREAD PROBLEM: CORRECTIVE ACTION

Senator McIntyre. Mr. Secretary, I do not even pretend to understand the intricacies of this Lockheed problem, but I do have a glimmer of the severity of the whole issue, and I do not know who Mr. Haughton is but I think he was perhaps pretty courageous. He says in the last paragraph of his letter to you: "In the absence of prompt negotiated settlement there is a critical need for interim financing to

avert impairment of continued performance."

My little State of New Hampshire cannot be compared to California, but we have one principal industry up there that has done excellent work for the Navy, especially, and for other services. For over a year and a half they have continually bugged me about negotiations that they are trying to carry on with the Defense Department. Problems have arisen. Remember now I have been practicing law and I know what a client thinks of his case sometimes and I realize there is another side, but this company is now forced to borrow money at 14 percent while these sums are held up, held up in litigation, held up in some problem that you even admit yourself involves some kind of a procurement policy that is not fitting. In the absence of prompt negotiated settlements, if I could think that Lockheed was the only industry in this fix—but, as I think the Senator from Colorado hinted, it is my understanding that there are many companies standing in the wings with this particular problem right on their backs, and they are not so lucky as to get 8½-percent money.

Some of them are paying up to 13 or 14 percent interest and it is

raising the devil with their profits.

Now, appreciating that the problems as you say are extremely complex and extremely difficult, I would simply urge whoever is in charge of settling some of these cases to get about the business of settling and get rid of it. If it is a difference between 6 and 10 percent profit, for goodness sakes compromise and get the money into their pockets and live up to settling these cases which would be a lot better than stringing them out in litigation.

There have been several questions here that have alluded to how many other companies in industry are in this pickle with the Defense Department, and arguments over what was meant and who was wrong

and who was right.

This may be one area, Mr. Packard, that you can improve, because everything I have heard about your performance to date has been tops.

I know that sometimes you must get pretty discouraged over there when you see some of the layers of paperwork, but certainly for this Lockheed problem I am sure you will come up with a solution that will be proper and appropriate, but let me alert you to what you know better than I as to other instances of tieups that ought to be taken care of in a businesslike manner without any 18 lawyers.

Thank you very much.

Mr. PACKARD. I appreciate the comment, Senator.

Chairman STENNIS. Senator Thurmond.

SHIP CLAIMS

Senator Thurmond. Mr. Secretary, I had a good many questions, but I believe in the course of the hearing you have answered most

of them, so I just have a few more.

You state that Lockheed claims for the Navy ships approximate an anticipated loss on these contracts. Does this mean that the losses have already been incurred or that a portion of these losses are projections over the remainder of the contract life, and how can it also be determined on the LPD's when delivery will not be completed for quite some time?

Mr. PACKARD. I believe, Senator, that in the case of the shipbuilding claims, a good deal of the losses have already been incurred. In other words, the company has already spent the money. The question now is whether they are entitled to reimbursement for their expenditures, as well as their projected costs.

This is the general situation in the whole shipbuilding industry.

This shipbuilding problem is not limited to Lockheed.

Secretary Shillito says that that figure includes the projected losses on the contracts that are not completed. So there is some incurred loss and some projection. Perhaps Secretary Shillito could address that.

Mr. Shillito. We can give you a breakdown on this.

Senator Thurmond. Will you just supply it for the record?

Mr. Shillito. Yes, sir; we will. (The information follows:)

Claims arising under shipbuilding contracts that are complete approximate \$71.7 million. Claims arising under shipbuilding contracts that are incomplete approximate \$101.9 million.

PROCUREMENT PRACTICES

Senator Thurmond. Mr. Secretary, you state that the contractor cost estimates in price competition for these ships now appears to be unrealistic.

You also state that the contractor's claims approximate its losses. These statements appear to indicate that the Government is being requested to compensate the contract for an unrealistic estimate made in keen competition. Do you believe that this is a proper way to carry out the procurement practices of the Department of Defense?

Mr. PACKARD. As I have already indicated, Senator, I am not satisfied that this is a proper way to handle our procurement program.

SRAM PROGRAM CLAIM

Senator Thurmond. Concerning the SRAM, does the Government have any direct relationship with Lockheed on the SRAM program?

Is the Lockheed claim an immediate responsibility of Boeing, and how then can the Government be expected to assist in financing for something in which it only has an indirect relationship?

Mr. PACKARD. Lockheed is a subcontractor to Boeing. Technically we do not have a direct relationship with the Lockheed Co. on this.

The claim was submitted to Boeing. The Boeing Co., instead of settling the claim, has passed the claim on to us with the recommendation that the claim be negotiated.

CHEYENNE DISPUTE

Senator Thurmond. I have one question on the Cheyenne. Why will it be the first of next year at the earliest that we can expect a decision by the Armed Services Board of Contract Appeals with reference to the Cheyenne contract dispute with Lockheed?

Mr. PACKARD. The determination by the Armed Services Board of Contract Appeals involves a procedure which requires that it carefully ascertain the facts, and be sure it has the entire problem in mind

before it makes a determination.

As Secretary Shillito indicated, there is some time needed in order to get the facts. Often there is a time involved in communicating back and forth. We already have and we will continue to encourage the Board of Contract Appeals to accelerate its handling of the case, but at the same time we want its determination to be as fair as possible, both to the Government and the company.

Senator Thurmond. Mr. Secretary, that is all the questions I have now. I just want to take this opportunity to congratulate you on the procedures you have instituted over there, and everything you have done and are doing to try to procure for the Department equipment

and supplies and materiel at the most economical cost.

I have also been informed about the manner in which you are handling your other duties and I have been very much impressed.

Mr. Packard. Thank you very much, Senator.

Chairman STENNIS. All right, members of the committee, if there are other questions on the Lockheed matter we will go around again; otherwise, we will go to the hearing on the main battle tank. You will remember we put the tank under the guidance of Secretary Packard last year. We have not had a chance to get his special report and recommendations on it, so if you are ready, Mr. Secretary, we will proceed now. Is there anything else you want to say on this Lockheed matter, before we leave it?

Mr. PACKARD. No, I think not, except to emphasize that we will be glad to have any questions from the committee because they will be

helpful to us.

Chairman STENNIS. Those questions will be coming in. You have been helpful to us. I want to emphasize I think we will just have to have something definite from you when we go to mark up the bill. Of course, the bill won't be marked up just as soon as we finish the hearing. There will be an interim hearing. Senator Symington?

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PRECEDENTS

Senator Symington. Mr. Secretary, at least to some extent what we are talking about is something you and I talked about over a year ago.

I would hope, when you make a decision, that you realize you are going to be establishing precedents.

Mr. PACKARD. I understand.

Senator Symington. And if Senator Dominick is correct in what he said he had heard, those precedents could involve more billions of dollars before we get through, at taxpayers expense.

It seems as if almost every day one might say, "a new one" has

turned up.

One I can think of is in the Air Force, another in the Navy, another in the Army. There are others that are obvious from our discussion this morning, so I would hope the question of precedent is around as the decision is made. I say that without premeditated thinking about it.

Mr. Packard. I think I understand that, Senator.

Senator Symingron. Listening to your excellent and objective presentation this morning—

Mr. PACKARD. Thank you.

Senator Symington (continuing). Thank you, Mr. Chairman.

Chairman STENNIS. Yes, sir.

All right, Mr. Secretary, will you proceed? Mr. Shillito, we thank you for being here.

Mr. Shillito. Thank you, Senator. (Additional information follows:)

Assistant Secretary of Defense. Washington, D.C., March 20, 1970.

Mr. T. EDWARD BRASWELL, Chief of Staff. Senate Armed Services Committee, Old Senate Office Building, Washington, D.C.

DEAR MR. BRASWELL: I am enclosing with this letter answers to questions which Senator Stennis submitted concerning the Lockheed Aircraft Corporation. As Colonel Benefield has told you, we will furnish the Chairman with further information in answer to his questions as it becomes available.

I am also enclosing a copy of a letter from Senator Proxmire to Mr. Elmer Staats, a related letter to Secretary Laird, and Secretary Laird's reply. Along with this, copies are attached of statements which we are giving the GAO in

response to Senator Proxmire's requests.

We are responding to several of Senator Proxmire's questions by submitting copies of Secretary Packard's prepared statements before the Armed Services Committees and referring the GAO to this testimony. As you already have this, it is not included with these enclosures. The statements which we are enclosing add, to some extent, to that which has already been submitted to you, the Chairman, and the Committee. These attachments include:

 A statement of the value of Government-owned property in the possession of Lockheed under contract with the Department of Defense.

(2) Statements from each of the Services on the need and justification for major military programs under contract with Lockheed.

(3) A statement from the Air Force estimating the effects on Lockheed of terminating the C-5A at the end of Run A (58 aircraft).

(4) A statement of total progress payments paid to Lockheed by the De-

partment of Defense in CY 1969.

(5) A list of NASA contracts with Lockheed; a statement of the value of Government-owned property in possession of Lockheed under contract with NASA.

We are in the process of compiling a list of all Lockheed's contracts with the Department of Defense. As presently planned, our list will itemize each contract

with a value of \$5 million or more and will show the amount disbursed on each such contract to date. Where possible, the itemized contracts will be related to a weapon system. A single line item will be included for all contracts under \$5 million in value. Because of the difficulties involved in gathering this data from different sources, we expect that the list will require at least two weeks to compile. We will furnish the Committee with the list as soon as we have it in completed form.

Sincerely,

BARRY J. SHILLITO,
Assistant Secretary of Defense
(Installations and Logistics).

COMMENTS AND ANSWERS TO THE QUESTIONS POSED BY SENATOR STENNIS

1. The Lockheed Corporation, as we know, has a number of other contracts with the Department of Defense on which there is apparently no financial problem. In order to have a complete record would you provide a list of all the present contracts between Lockheed and the Department of Defense and explain the amounts of these contracts in detail.

Answer: A list of all major contracts between Lockheed and the Department of Defense is being compiled. It will require approximately two weeks to obtain this information from the Services computer centers. As soon as the data is assembled and verified it will be forwarded to the Chairman.

2. Would you also provide for the record a break-out of the financial condition of each of the Lockheed subsidiaries. Apparently some are making money and doing all right in contrast to others.

Answer: In their annual report Lockheed consolidates the financial data for all divisions and subsidiaries. Detailed information for each activity is not available at this time to the DOD, nor is such data routinely supplied to the SEC. Information of this nature is considered proprietary by Lockheed; it is suggested that the company be requested to submit it directly to the Committee.

3. Another complicating aspect of this matter relates to the commercial aircraft of Lockheed, the L-1011. It is understood that Lockheed also has a severe financial problem on this matter.

Is it true that there is a cash flow deficit of about \$100 million for this activity?

How do you propose to make certain that no Defense funds bear the responsibility for the problems relating to the commercial aircraft of Lockheed?

Answer: Answers to the first two parts of this question should be provided by Lockheed directly to the Committee since this information is considered by Lockheed to be proprietary.

Regarding the third part of the question, we will develop accounting and cash controls which will adequately safeguard the funds provided by the Government. These controls will be tailored specifically to the conditions at Lockheed at the time financial assistance, if this turns out to be the course we follow is granted. Such controls may include imprest cash accounts, budget reviews, expenditure approvals and other actions of a similar nature.

i. The Chair understands that there are some subcontractors on the C-5A matter who have lost money although they are not confronted with going broke as in the case of Lockheed. At the same time these small companies might well desire to avoid any losses under these contracts. What sort of precedent does any sort of settlement with Lockheed create with these other corporations?

Answer: Any settlement agreement between Lockheed and the Government would not establish a precedent for subcontractor claims directly against the Government, absent a specific agreement to allow such claims on the part of the Government or an assignment of the subcontract by Lockheed to the Government with the Government's consent. The Government has no privity of contract with these subcontractors, therefore, there is no contractual basis for prosecuting a claim against the Government. The Armed Services Procurement Regulation specifically forbids any settlement agreements between the prime contractor and its subcontractors which have the effect of binding the Government to these agreements.

5. It is understood that the Air Force has already extended Lockheed \$100 million in the form of interim financing in January of this year in the form of revising the contract ceiling as now permitted by law. Is this correct?

Ansicer: Additional interim financing in this sum has been extended to Lockheed, taking into consideration estimated price adjustments in accordance with the contract terms, that recognized the potential need for interim repricing of the contract prior to the final repricing that is to be accomplished after completion of production Run A. Additionally, on 13 March the contract ceiling was increased by another \$50 million, also an interim repricing. The interim repricing involved (\$150 million total) is substantially lower than the amount that will ultimately be required under the Air Force contract interpretation.

CONGRESS OF THE UNITED STATES, JOINT ECONOMIC COMMITTEE, Washington, D.C., March 10, 1970.

Hon. MELVIN R. LAIRD, Secretary of Defense, Washington, D.C.

DEAR MEL: On this date I have requested from the General Accounting Office a comprehensive review of the Lockheed Aircraft Corporation's military, space, and related contracts. A copy of my letter to the Comptroller General, Elmer Staats, is enclosed. I have asked Mr. Staats to complete his review within ten days from the date of my request.

As you know, Lockheed has made a most extraordinary request to the Department of Defense. As I understand this request, its approval could entail an outright subsidy of a loan to this contractor in the amount of approximately \$640

million.

It is essential, in my judgment, that an application for funds of this magnitude be passed upon by the Legislative Branch. The review I have asked the General Accounting Office to conduct is intended to develop some of the facts upon which an intelligent decision can be reached by the Congress.

Although some of the information has been made known by the Department of Defense to the press and, to a limited extent to the Congress in executive closed-door sessions, it is important for the Congress as a whole to be fully informed.

I am further requesting that no administrative actions be taken to approve the Lockheed application for funds prior to the completion of the General Accounting Office review and prior to the consideration of this review by the Congress. Any actions taken before this can be done will, in my judgment, be premature and could have serious and harmful effects on the defense industry, the defense program, and the national economy.

Sincerely,

WILLIAM PROXMIRE, Chairman, Subcommittee on Economy in Government.

Congress of the United States, Joint Economic Committee, Washington, D.C., March 10, 1970.

Hon. Elmer Staats, Comptroller General of the United States, General Accounting Office, Washington, D.C.

DEAR ELMER: This letter is a formal request for the General Accounting Office to immediately undertake an investigation of the financial condition of the Lockheed Aircraft Corporation and its ability to continue performance of its military contracts.

You will recall that the Subcommittee on Economy in Government of the Joint Economic Committee has conducted a continuing inquiry into military procurement for many years and, since 1968, has paid particular attention to several of the major weapons systems for which Lockheed is the prime contractor.

As you know, Lockheed has recently informed the Department of Defense that unless it receives "further financing" from DOD, it will be "impossible for Lockheed to complete performance of these programs." Lockheed refers to four of the larger programs it is working on, the C-5A, the Cheyenne helicopter, the SRAM missile, and nine shipbuilding contracts, and requests approximately \$641 million from the Government for what it terms "interim financing."

Although this action has been termed unprecedented by some officials, there is a question as to whether we are witnessing only a variation of one of the oldest military procurement themes: buy-in-now, get-well-later. Is it possible

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that the contractor is attempting to develop a new way to pay for massive cost overruns?

Because of the magnitude of the sum requested, the uncertainties that exist, and the incompleteness of the information that has been made public so far. I believe it is imperative that GAO make a comprehensive review of all of Lockheed's military, space, and related contracts at the earliest possible time.

Your report should include the following:

1. A list of all Lockheed military, space, and related contracts, their dollar amounts, the funds authorized and appropriated so far, and the sums paid to Lockheed as reimbursement to date for each of those programs;

2. The amount expended to date by Lockheed on its commercial version of the

C-5A, the L-1011;

3. The value of Lockheed's net assets;

4. The total amount of government-owned property held by Lockheed;

5. The amount of progress payments paid to Lockheed on its contracts in calendar year 1969;

 The cash requirements for all major Lockheed Aircraft programs over the next two years, including the L-1011;

 The cash deficits and surpluses for all major Lockheed programs, including the L-1011, on Lockheed premises and customer premises;

8. A copy of the full Arthur Young and Company audit report on Lockheed;

9. A summary of DOD military needs justifications for each of Lockheed's major military procurements;

10. An estimate of the effects on Lockheed's cash picture if the C-5A program were terminated at 58 aircraft;

11. GAO's response to Lockheed's criticism of Total Package Procurement;

12. The details of possible solutions to the Lockheed crisis considered by DOD, including bankruptcy, break-up of the Lockheed Corporation, and substitution of new tenants for the Government's Marietta, Georgia, and Sunnyvale, California, plants.

I urge you to complete this report within ten days from the date of this letter. As you can see, we are not asking your office to make any analysis or evaluation of the facts, but rather to gather them together for transmission to Congress.

In view of the urgency of the situation and the impact that a decision could have on the Federal budget and the national economy, time is of the essence.

Sincerely,

WILLIAM PROXMIRE, Chairman, Subcommittee on Economy in Government.

THE SECRETARY OF DEFENSE, Washington, D.C., March 17, 1970.

Hon. WILLIAM PROXMIRE, U.S. Senate, Washington, D.C.

DEAB BILL: Thank you for your letter of 10 March 1970 regarding the Lockheed Aircraft Corporation and your enclosed letter of the same date on this subject to Elmer Staats. As I am sure you can appreciate, this problem and the financial situation, which the Nixon Administration has inherited vis-a-vis Lockheed, are critical.

It is our understanding the current Lockheed management is working urgently on the overall Lockheed problem. Since the Lockheed resources have obvious national security implications, I hope that Lockheed will be able to find an appropriate resolution to their problem.

Since national security interests are involved, we have been responding to both the Senate and House Armed Services Committees. Details relating to this situation will continue to be made available to them as the situation develops.

We have been in consultation with the GAO and intend to keep them fully appraised. I can assure you that there will be no actions taken by the Department of Defense vis-a-vis this overall problem without complete review by the GAO and the appropriate Committees of Congress.

Any recommendations you may have should be passed on to the Senate and House Armed Services Committees and to me. Such recommendations would be most appreciated.

Sincerely,

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MARCH 19, 1970.

Mr. James H. Hammond, Associate Director, Defense Division, General Accounting Office, Washington, D.C.

Dear Mr. Hammond: At our meeting last Thursday, we agreed to assist with responses to questions posed by Senator Proxmire in his letter of 10 March 1970, to Mr. Staats, concerning the financial problems of the Lockheed Aircraft Corporation.

The attachments to this letter contain the answers that we are able to provide to questions numbered (4), (5), (9), and (10), in Senator Proxmire's letter. It is our understanding that you will obtain answers to questions numbered (2), (3), (8), and (11), from Lockheed directly or from your own sources.

In response to Question 1, a listing of Lockheed's contracts with the government is being compiled. There are, however, substantial difficulties in bringing this data together from different sources and in programming our computers for a print-out which is responsive to the request. Because of these difficulties, it appears that at least two weeks will be needed to compile this information. In the interim, our answer to Question 9 partially fulfills the requests in Question 1.

In response to Questions 6 and 7, we are attaching Mr. Haughton's letter of 2 March 1970 to Secretary Packard, along with copies of Secretary Packard's testimony before the Armed Services Committees. These attachments summarize Lockheed's cash deficits and cash requirements on government programs with which the Company has major problems.

We also submit the copies of Secretary Packard's testimony as our response to Question 12. In concluding both presentations, Secretary Packard addressed himself to the range of possible solutions. Our analysis of these solutions is still in an exploratory stage, and we are simply unable at this time to outline the details of each alternative approach to this problem.

Sincerely.

ROBERT C. MOOT,

Assistant Secretary of Defense (Comptroller).

THE VALUE OF GOVERNMENT-OWNED PROPERTY HELD BY LOCKHEED UNDER DOD CONTRACTS

Office of the Assistant Secretary of Defense, Washington, D.O., March 18, 1970.

Memorandum for the Director, procurement policy, OASD (I & L) Subject: Government-Owned Facilities Held by the Lockheed Aircraft Co.

In response to your 12 March 1970 memorandum on the above subject, the following answers your request on the total value of government-owned facilities held by Lockheed.

Government-owned industrial facilities in possession of the Company (all plants) as of 31 December 1969.

Category:	value value
Land	\$8, 433, 000
Buildings	92, 112, 000
Utilities	5, 933, 000
Sub-total (real property)	106, 478, 000
Industrial plant equipment	79, 060, 000
Other plant equipment	26, 468, 000
Total industrial facilities	212, 006, 000

ALLEN T. STANWIX-HAY,
Major General, USA, Deputy Assistant Secretary (Materiel).

Service Statements on the Need for Major Military Programs Under Contract with Lockheed

ARMY

CHEYENNE AIRCRAFT

Today the Army faces a diverse set of threat forces and we must fully exploit those technological advances which can improve our ability to perform traditional Army functions. Analysis of the threat reveals antiarmor as the primary role of the attack helicopter in a European type conflict. This is not

to downgrade the capabilities of the attack helicopter in other roles such as direct aerial fire support, armed escort, reconnaissance and security missions.

In determining how to meet the threat, the Army examined available alternatives. The examination revealed the value of a well-balanced force, including both ground and aerial antiarmor systems. Infantry antitank systems deny favorable terrain to the enemy with continuous, all-weather coverage of the front; however, because of low mobility, these systems are avoidable by maneuver and require large numbers of weapons to effectively cover frontages in depth. Armored antitank systems are more mobile and can concentrate more quickly; however, these systems are restricted in movement by rough terrain and low trafficability.

Attack helicopters are important complementary systems that can concentrate within minutes from dispersed, protected positions to counter enemy armor threats of unexpected nature and location; thus, reducing the attacker's advantage of surprise. The attack helicopter pitted against enemy armor, while revolutionary in concept, is not a departure from the Army's role in combat; it merely combines the Army's best antitank weapon with its most mobile platform. Because of the helicopter's ability to stop in mid air or go very slowly, it can operate in weather conditions that prevent operations of fixed-wing aircraft and the need for costly fixed bases of operation can be eliminated.

Use of the AH-1G Cobra is the fastest way to obtain this capability; nevertheless, the limitations of this expedient solution dictate a more permanent solution that can respond better to the anticipated threat. The CHEYENNE will carry more antiarmor missiles, move faster, have longer combat endurance, be armored against automatic weapons fire, have accurate stand-off weapon capability and, most important, retain this effectiveness under low visibility conditions and at night. The Cheyenne will have built-in flexibility which has special value in European type warfare. Its multiple armament load and various pod configurations will permit the Cheyenne to attack two different targets simultaneously. Its night and adverse weather capability will further limit enemy flexibility. These tactical capabilities are essential to successful operations against anticipated enemy forces.

YO-3A AIRCRAFT

In response to a stated need in Vietnam, the U.S. Army is developing 11 YO-3A aircraft under contract to Lockheed Missiles and Space Company, a Division of Lockheed Aircraft Corporation. The YO-3A aircraft is a quiet aircraft that has evolved from previous R&D efforts on the QT-2, a powered sail plane. It is designed for quiet, night aerial surveillance over the battlefields of Southeast Asia. It has sensors installed onboard that are specifically designed for night surveillance. These sensors combined with the quiet features of the aircraft make the YO-3A system a valuable complement to existing surveillance systems of the Army and further deny the use of darkness as a concealment for enemy activity.

AIR FORCE

C-5A AIRCRAFT

The Joint Chiefs of Staff and the Air Force agree on the military requirement for at least six squadrons of C-5As. The Army also supports this position in the Joint Strategic Objective Plan. The basis for the six squadron C-5 force is the requirement for rapid response to contingency deployments and other essential airlift support needs. Classified details of these specific needs and the capability and limitations of our forces have been made available to Congress. The C-5A provides the capability to meet the increased outsize cargo requirements of a modern mobile Army and enables the USAF to phase out the obsolete and slower C-124/C-133 cargo carriers.

From a military standpoint, having the strategic airlift capability to rapidly deploy adequate forces simultaneously with their heavy equipment anywhere in the world affords the U.S. greater deterrence at reduced cost. The knowledge that rapid deployment by air can be accomplished in such a short time provides additional time for responsible officials to consider their decision to deploy a military force. Response time is additionally of great importance for providing rapid resupply to meet rapidly fluctuating consumption rates during the early stages of a contingency without having to maintain large logistic stockpiles in the contingency area, and for providing timely reinforcement as appropriate. Finally, the capability for immediate deployment of a decisive force could under some circumstances deter an armed conflict.

In a major contingency, more than one division would, of course, be required. The six squadron C-5A program was developed on the basis that the Department of Defense would also use the available ships, the Civil Reserve Air Fleet (CRAF) and other aircraft programmed in Airlift Forces in order to complete movement of the total forces which would be committed to contingency situations. In evaluating the need for the C-5A aircraft it is essential to recognize that the time saving available through the use of airlift rather than sealift does not apply only in the initial days of the contingency. A combat unit cannot start moving, by sea or by air, until it is assembled and equipped. As each unit becomes ready to move during the initial weeks or months of a contingency, the same time saving is available by using airlift if the need for the unit in the contingency area is urgent enough to call for rapid deployment.

Only with the C-5A can we fully satisfy the total airlift requirement. Neither the C-141 nor any aircraft owned by or on order by the United States airlines possess the outsize capability of the C-5. No other aircraft can deploy the main battle tanks, large howitzers and other outsize equipment of our combat forces; thus without the C-5A the capability of a force deployed by airlift would be

significantly reduced.

The C-5, because of its ability to operate from semi-prepared short fields, can operate into many airfields that cannot be utilized by CRAF aircraft, and even into airfields not usable by the C-141. The C-5A also has the capability of air dropping personnel and cargo if necessary. This C-5A operating versatility provides combat forces being moved or resupplied with a wider choice of tactically favorable areas in which to deploy.

The reduced C-5A procurement was a result of dollar limitations imposed by budget constraints and an across the board increase in cost of major programs. Reductions have been made in all major programs. Each program has been reduced consistent with its requirement for Air Force resources, its effect on the overall Air Force capability and its ability to satisfy the commitments set forth in the national strategy. The Air Force has accepted the smaller C-5 fleet recognizing that more time will be required to complete the move of a contingency force because of the reduced amount of airlift available.

Other Aircraft Programs

C-130 Production.—Lockheed-Georgia is producing both C-130E and HC-130N for the Air Force at Marietta. Production is at a rate of about 3 aircraft per month with the last Air Force buy (18 C-130E's, funded with FY 70 funds) to be delivered in late calendar year 1971. A total of about 33 aircraft are yet to be delivered, with deliveries of the HC-130's beginning this month. The C-130E's are to be used as replacement aircraft to cover attrition in Southeast Asia where the C-130 has provided extensive airlift support to both U.S. and South Vietnamese forces.

C-130/C-141 Modification/IRAN/Support.—These programs (\$13 million) include major overhaul of older C-130s that require Inspection and Repair as Necessary (IRAN) and modifications to the C-130 fleet such as the AC-130 gunship program and the Adverse Weather Delivery System (AWADs). The C-141 effort consists primarily of engineering support including continuing C-141 static and fatigue testing plus continuing engineering and related efforts associated with the C-141 program. There is no on-going C-141 production.

Other Major Lockheed Programs Include.—Support for the Air Force SR-71 program by Lockheed-California, primarily at Burbank and Beale AFB (ap-

proximately \$28 million).

Contract Maintenance and IRAN support for the F-104G Training program for the German Air Force being conducted at Luke AFB, Arizona. This is a foreign military sales program (about \$19 million, Lockheed-California).

C-121 IRAN by Lockheed Air Services, Inc. This program provides major overhaul of Air Force and Air Guard EC-121 and C-121 aircraft (about \$3 million).

Support of the VC-137 and C-140 Aircraft of the Special Air Mission (SAM) aircraft of the Military Airlift Command. Lockheed Air Services, Inc. (about \$3 million).

SRAM Missile

The existing threat predictions clearly result in an Air Force requirement for a missile to provide aircraft attacking targets in heavily defended areas with the capability to penetrate terminal defenses in the 1970 time period. The Short Range Attack Missile (SRAM) is the weapon system that has been under development by the Air Force since late 1966 to provide the B-52 G/H and FB-111

bomber force with this capability. The SRAM weapon system is now in the final testing stages of development. The testing results to date have been satisfactory and it is intended to initiate long lead time production go-ahead in late fiscal year 1970. This will be followed by incremental year-by-year procurements of SRAM to satisfy the operational requirements. SRAM is a short range attack missile armed with a nuclear warhead. It is being developed by the prime contractor, Boeing. Seattle, Washington, with the Lockheed Propulsion Company, Redlands, California furnishing the solid rocket motor portion of the missile under a subcontract with Boeing

NAUV

POSEIDON MISSILE

The POSEIDON missile is an integral part of the POSEIDON strategic deterrent system. Eight POLARIS submarines (SSBNs) are presently in shippards being converted to carry the POSEIDON missile. The conversions and all related development, procurement and support functions are proceeding on a coordinated schedule with very high confidence of meeting the scheduled SSBN deployment dates. An interruption to this coordinated schedule, in any of its major parts, would deprive the Nation of a portion of the planned deterrent capability, as these SSBNs would not be able to assume their planned share of the strategic targeting plan.

The POSEIDON missile contract, N00030-66-0186, is a multi-year development and procurement contract for the missile sub-system. It includes missile development and flight test, the development of installed SSBN and tender equipment, the development of equipment for supporting facilities, and the procurement of sufficient quantities to support an initial operational capability. Some of the SSBN and tender equipment and much of the shore support equipment has been delivered. This effort is indispensable to meeting the initial operational capability: if it is not continued on schedule, contracts with many other contractors for other POSEIDON sub-systems and for submarine and tender conversions would have to be adjusted accordingly. As the SSBNs now undergoing conversion could not be redeployed on schedule, even with POLARIS missiles, the Nation's deterrent posture would be seriously affected.

The POSEIDON missile contract, N00030-70-C-0092, is the second procurement of missiles to outfit SSBNs as they complete conversion. It is currently a letter contract, scheduled for definitization this fiscal year as actual cost data from the initial procurement provides a solid basis for cost negotiations. First deliveries under this contract are scheduled in 1971 in time to outload submarines now being converted. Without these POSEIDON missiles the submarines would not be able to assume their planned target coverage, as they will not be able to launch POLARIS missiles. Interruption to effort under this contract would delay POSEIDON deployments and affect the coordinated schedule of conversions involving shipyards and other weapon sub-system contractors.

POLARIS MISSILES

Under the US/UK POLARIS Sales Agreement the United Kingdom has bought POLARIS A3 (less warhead) missiles for its strategic deterrent submarines. These missiles are procured by the Strategic Systems Project Office for the UK.

The A3P missile contract, N00030-67-C-0085, was the fifth procurement of POLARIS A-3 missiles and related spares and components. Nearly all the missiles were for UK requirements. Interruption to this contract might affect US commitments under the Sales Agreement and delay final settlement of the contract with Lockheed.

POLARIS SUPPORT SERVICES AND TACTICAL ENGINEERING SERVICES

Lockheed is the missile sub-system contractor for the POLARIS and POSEIDON programs. In this capacity Lockheed has provided the Navy with expert engineering and technical support through the development, production and operational phases. Lockheed has contractual responsibility for missi'e subsystem reliability, and has helped the Navy to attain and maintain a level of operational dependability consistent with the strategic role of the Fleet Ballistic Missile system.

Under the POLARIS support services contract, N00030-70-C-0008, Lockheed provides resident engineers and technicians at the POLARIS Missile Facilities and other field locations during FY 1970. These contractor personnel advise the Navy in the performance of missile assembly and maintenance functions, help-

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ing in the resolution of technical problems. Related support by Lockheed plant personnel in Sunnyvale are also included under this contract. Interruption of effort under this contract would impact upon the Navy's ability to complete POLARIS A3T modifications and support fleet operational requirements, ultimately involving reliability of the deployed POLARIS forces. As part of the contract relates to POSEIDON, some impact upon the Navy's ability to meet the initial operational capability date for that system might also result.

Under the POLARIS tactical engineering services contract Lockheed acquires, analyzes and provides to the Navy that information essential to the preservation of POLARIS reliability. Information is derived from SSBN patrol reports, trouble-and-failure reports, unsatisfactory reports, test reports, material status reports and many other inputs from operational forces, POLARIS Missile Facilities, test sites and logistic activities. Through systematic analysis and correlation of this data Lockheed determines failure modes, rates and trends; deterioration and degradation predictions; operational deficiencies and other phenomena that would potentially reduce system reliability. The contractor recommends corrective actions, maintenance procedures and design modifications indicated by analysis of problem areas, and maintains configuration control and inventory status for all missile components. Without continuous availability of such information and recommendations the Navy would be unable to make intelligent decisions necessary for the maintenance of Fleet Ballistic Missile System reliability.

POLARIS SUPPORT EQUIPMENT

Although the generic title of this contract refers to POLARIS, the effort is actually required for POSEIDON. The procurement covers missile test and readiness equipment that is to be installed aboard SSBNs when they are converted to a POSEIDON capability. This equipment monitors all electrical and electronic circuits of the missile to detect malfunctions that would affect readiness for launch. It is an indispensable element of the weapon system on each SSBN.

The support equipment contract, N00030-70-C-0076, procures equipment for seven SSBNs that are to be converted from POLARIS to POSEIDON. It is a follow-on contract to the initial procurement of such equipment under contract N00030-66-C-0186. Deliveries are scheduled in phase with conversion contracts and the procurement of other weapon subsystems. Interruption of effort under this contract would jeopardize conversion schedules and would probably require adjustment of other related contracts.

POLARIS AST MISSILES

The POLARIS A3T missile is a necessary modification of the original A3 missile configuration. All deployed US and United Kingdom (UK) POLARIS A3 missiles will eventually be of the A3T configuration.

The A3T missile contract, N00030-67-C-0177, procured A3T missiles for the United Kingdom and kits for modification of previously purchased US and UK A3 missiles to the A3T configuration. Deliveries are essentially complete. Interruption to this contract would affect small quantities of hardware, but might affect contractor warranties on modification kits not yet installed. Final settlement of the contract with Lockheed might be delayed.

POLARIS A3 P/E MISSILE

The POLARIS A3 missile is the major weapon with which our sea-based strategic forces are now equipped. The A3-P configuration is deployed on submarines; the A3-E configuration is used for performance demonstration and operational tests.

The A3 P/E missile contract, NOsp 66004, was the fourth procurement of these POLARIS missiles. All major hardware has been delivered, but related spares orders are not yet finally priced out. If further work under this contract were delayed, the effect would be primarily administrative, delaying final settlement with Lockheed.

SAFEGUARD SYSTEM TEST TARGET PROGRAM

The Navy is participating with the Army in the SAFEGUARD development

program by providing test targets.

The SSTTP contract, N00030-68-C-0303, is funded jointly by the Navy and the Army. It covers most of the Navy's participation in the SAFEGUARD program through FY 1970, including development of test programs and configurations. If the work under this contract were interrupted, both Army and Navy SAFEGUARD schedules would slip, and related work now underway in other portions of the program would be impacted, necessitating probable adjustments to other contracts.

MK 86 GFCS MILITARY NEED/JUSTIFICATION

The MK 86 Gun Fire Control System is a modern, digital, weapon control system planned for inclusion in the weapon system suits of the DLGN-36, LHA, DD-963 and DLGN-38 ships. The system represents a vast increase in rapidity of response, accuracy, ability to engage several targets simultaneously, and reliability over present fire-control systems, which are essentially of World War II vintage.

The systems currently under contract are needed to avoid a compromise of the operational effectiveness of the new generation ships currently planned or authorized. The MK 86 Gun Fire Control System will provide a fire control system, of uniform design, possessing the flexibility characteristic of digital systems suitable for employment in modern ships.

RP-8D AIRCRAFT

The RP-3D (PROJECT MAGNET) aircraft is needed to collect current and accurate data on the earth's continuously changing magnetic field. This important and necessary effort is required for accurate navigation, space programs and scientific research. Two aircraft, an NC-54R and an NC-121K, are currently performing this mission. The RP-3D will replace both of these aircraft. The RP-3D will have a greatly extended range and almost twice the speed of the NC-121K aircraft. This new aircraft will allow coverage in portions of the South Pacific currently not now capable of being covered by the NC-121K aircraft.

The present aircraft conducting this mission are aging, and spare parts are a major problem with them. This situation will be relieved by the RP-3D through a reduction in the maintenance required and the greater availability of spares. Another critical area is the availability of fuel. Repeatedly there is a frequent requirement to preposition 115/145 aviation gasoline for the two current aircraft since many of the world's larger airports are jet oriented and stock only the kerosene type fuels.

The improved navigation suit and magnetometer unit on the RP-3D aircraft will provide greater sensitivity and accuracy in the collection of magnetic data.

The new RP-3D will be able to perform its mission over land as well as at sea. The over-water mileage covered by this aircraft annually would require at least three ships operating full time to match this accomplishment and their investment and operating costs would far exceed that of the RP-3D aircraft.

In summary, the RP-3D will provide additional magnetic survey mission reliability and capability on a more cost effective basis.

S-3A AIRCRAFT

The S-3A is a carrier based anti-submarine search and attack aircraft with a general purpose computer oriented avionics system. It is designed to counter the threat of the modern nuclear powered submarine during the 1975-85 time period. It will be equipped with the latest advances in acoustic and non-acoustic anti-submarine sensors. The efficiency of these sensors will be enhanced by integrating sensor information with the data bank of the digital computer, the output of which will be presented on cathode-ray tube displays. The S-3A will far exceed the capability of the current carrier anti-submarine aircraft (S-2E).

It will provide a carrier based capability of searching large areas of ocean and will provide protection for the carrier or other units independent of land bases.

P-3C AIRCRAFT

The P-3C is a very long range patrol aircraft capable of conducting antisubmarine operations including the detection, classification, tracking and localization of conventional and nuclear submarines. The aircraft's missions include offensive anti-submarine warfare, contact investigation, convoy escort, task force protection, and barrier operations; with secondary missions of ocean surveillance and aerial mining.

The P-3C model is the first of the Orion series to employ the ANEW system which features the use of an on-board digital computer to integrate the ASW sensors including radar, active and passive acoustics, passive electronic countermeasures, magnetic anomaly detection (MAD), and low light level television detection. The P-3C ANEW capability is considered to be the minimum capability consistent with the rapidly emerging Soviet submarine threat which now includes the Yankee SSBN type.

C-130 AIRCRAFT REWORK

After a considerable amount of operating experience with the C-130 aircraft, it was discovered that cracking in the main box beam of the wing was occurring in the B, C, D, and E models.

This modification consists of a major rework of the center wing section of the C-130 to extend its service life. The increased fatigue resistance is accomplished by reducing stress concentration and improving fatigue characteristics in local areas that have been found to be fatigue critical.

HIGH POWER VLF AIRBORNE TRANSMITTER

The TACAMO system has limited radio coverage due to low transmitter power. To aid in rectifying this, Lockheed received a contract to demonstrate the feasibility of employing a higher radiated power system. The system also is to include a new antenna capable of handling the higher power. The demonstration and testing is scheduled to be completed 22 March 1970 and only completion of technical reports and reconfiguration of the Lockheed aircraft back to its original status will remain to be accomplished.

EC-130 AND LC-130R AIRCRAFT

Eight EC-130Q (TACAMO AIRCRAFT) have been added to four similar aircraft already in operation. These additional EC-130Qs provide the backup necessary to insure more adequate VLF relay communications in the Atlantic and Pacific areas.

The one LC-130R (ski-equipped) DEEPFREEZE aircraft provides additionally needed aerial logistic support to the United States scientific efforts on the five and one-half million square mile continent of Antarctica. The LC-130R is utilized to transport passengers and cargo between the continental United States, New Zealand, Antarctica and outlying stations. Additional missions include aerial reconnaissance, including photography, cartography and Search and Rescue assistance when required.

AIR FORCE ESTIMATE OF THE FINANCIAL IMPACT ON LOCKHEED OF TERMINATING THE C-5A PROGRAM AT 58 AIRCRAFT

To terminate the program at 58 aircraft would involve a partial termination for the convenience of the government since the Air Force has already contracted for an 81 aircraft program. The February 1970 Air Force cost estimate indicated that the probable cost-to-produce RDT&E and Run A (58 aircraft) would be \$2681 million. Against this cost the Air Force estimated price was approximately \$1792 million, leaving Lockheed with a deficit of about \$890 million. (\$252 million greater than its loss of \$648 million for an 81 aircraft program.)

Since stopping at 58 aircraft would involve a convenience termination the government would be liable for some amount of termination costs which would partially offset Lockheed's estimated loss of \$890 million. However, it is doubtful

if such termination costs, under the Air Force's contract interpretation would represent more than 15-20% of the estimated loss.

The matter of termination at 58 aircraft is further complicated by the fact that Lockheed's interpretation of the contract varies considerably with the Air Force's interpretation. Lockheed has already begun the litigation process over the question of the 81 aircraft program being a partial termination of the 115 aircraft program versus the Air Force's interpretation that it was exercise of an option with no termination involved. Therefore, Lockheed would undoubtedly go to court on the basis that stopping at 58 aircraft was a second convenience termination against a contract for 115 aircraft. In other words, litigation would not only continue, it could be expanded by a second termination issue.

PROGRESS PAYMENTS TO LOCKHEED

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE, Washington, D.C., March 19, 1970.

Memorandum for Mr. John Spratt.

Subject: Lockheed contracts.

This refers to the meeting this date in Mr. Tredwell's office with representatives of GAO concerning values of contracts with Lockheed Corporation.

With respect to Mr. Proxmire's question number 5, the amount of progress payments paid to Lockheed Aircraft Corporation on its contracts in calendar year 1969 was \$591,841,000. The amount of progress payments paid to Lockheed Shipbuilding Company in the same year was \$31,956,000.

With respect to progress payments to Lockheed Aircraft Corporation, two copies of the latest Progress Payment Status Report (31 December 1969) are attached.

GEORGE TIMBERLAKE.

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yments	Unliqui- dated	\$49, 089	82	92	12, 718 53, 803 1, 710	1,050	314 1,629	71, 961	5, 587	189 106 106	82 120 1,368 14,290	332 705	4, 272
Progress payments	Made	\$165, 402	92	88	63, 659 53, 803 1, 710	3, 616 2, 803 2, 604 2, 604	2,843 1,629	133, 655	425 - 25, 831	189 152 898	82 432 16, 632 14, 290	9,7,7,7,7,9,7,100 1,3,43,100 1,3,43,100 1,0,	3, 228 4, 666
Coete inc	undevel- oped items	\$74,945	115	115	20,000 58,522 1,832	1, 925 1, 660 1, 784	203 667 2, 065	89, 238	6, 985	271 218 246	103 539 6, 197 17, 863	5 782 635 881	6,718
	Inc., Total	\$148,983	115	115	148, 482 58, 522 1, 832	3, 792 3, 504 539 6, 110		230, 296	32, 288	271 218 1, 283	103 23, 760 17, 863	4, 9, 250 1, 919 1, 919	7, 143
	Unbilled amount	\$211,929	240 126	386	20, 296 157, 287 3, 124	2, 317 2, 547 2, 547	220 4, 101 2, 077	195, 417	691 57, 796 68	238 238 238 238 238	267 25, 054 32, 800	4, 319 761 1, 060	6, 172
	Face amount	\$287, 422	240 126	386	95, 956 157, 287 3, 124	5, 186 4, 584 7, 714	4, 283 2, 120	282, 034	691 85, 756 68	1, 218 1, 400	267 44,000 32,800	6, 443 13, 214 2, 205 1, 490	5,021 10,205
	Contract number and disbursing office	Litton Systems, Inc., Litcom Division (\$554,820,000): Company total	Allied Prod. Corp., Loadcraft Division (\$555,030,000): A0A625 69 C0711 0000 S529600	Army total	Lockheed Aircraft Corp.: (\$555,240,000): A0A011 66 03557 0000 A00547 A0A01 68 01749 0000 A00547 A0A01 68 01749 0000 S29800 A0AA25 68 C0195 0000 S29800	20035 20035 20035 20035	3865 2865	Army total	67 C1403 0000 68 C2530 0000 68 C0209 0000	62 09221 0000 F592 67 C0237 0000 F592 68 A0067 0040 F592	F04506 69 A0136 0004 F582400 F04606 68 A0067 0021 F592400 F04605 67 C0176 0000 F592400 F33657 69 C0004 0000 F592800	67 C0369 0000 64 47651 0000 68 A0325 0194 68 C0900 0000	68 C0847 0000 67 C1035 0000

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30, 966 52, 660 52, 3157 207, 3157 207, 3157 69, 250 91, 624 11, 813, 691 11, 337 11, 337 11, 338 11,	3, 779, 357	9, 905 8, 905 6, 55 1, 28 1, 914 1, 914 1, 914 1, 914 1, 914 1, 914 1, 914 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
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44, 238 75, 238 75, 228 71, 228 75, 268 75, 268 75, 268 71, 10, 278 14, 113, 278 14, 113, 278 16, 110, 100 16, 505 10, 505	4, 637, 954	1, 130 11, 130 1, 163 1, 685 1, 685 1
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NASA PRIME CONTRACT AWARDS TO LOCKHEED AIRCRAFT CORP.

	Amount (thousands)	Rani
iscal year:		
1961	\$3, 335	15
1962	4, 951	2
1963	23.656	Ĩ,
1964	39, 019	i
1965	35.796	13
1000	44 C41	i
1967	42, 036	i
1968		1
1000	40, 460	
****		13
1970 (through Dec. 31, 1969)	18, 279	17
Total		

Note: See following pages for individual major awards on which work is currently being performed.

NASA active contracts of \$100,000 and over with Lockheed Aircraft Corp.!—Costs accrued in calendar year 1969

Contract No.:	housands	Contract	No.:	Thousands
Total	\$37, 111	NAS	5-10392	\$120
-		NAS	3-12033	102
NAS 9-5191	16, 206	NAS	3-12025	86
NAS 9-5384	13, 216	NAS	8-21459	68
NAS w-1631	1, 065	NAS		
NAS 3-8989	1, 030	NAS	2-5650	
NAS 3-8993	1, 022	NAS	w 1834	56
NAS 2-3500	512	NAS	5-9334	53
NAS 2-5168	501	NAS	1-7706	51
NAS 1-8200	414	NAS	3-11512	45
NAS 6-1315	352	NAS	2-5270	45
NAS 5-10679	331	NAS	2-5521	39
NAS 5-9487	318	NAS	5-11614	38
NAS w 1388	247	NAS	2-5419	36
NAS 2-4960	232	NAS	4-1556	34
NAS 1-7573	219	NAS	3-12037	32
NAS 8-24715	186	NAS	8-21022	18
NAS 5-9092	182	NAS	1-9242	2
NAS w 1774	135	NAS	5-21118	

¹ Contracts under which work is currently being performed.

LOCKHEED HOLDINGS OF GOVERNMENT PROPERTY ON NASA CONTRACTS

[In thousands of dollars]

Location	Value of plant equipment	Value of special test equipment	Tota
Lockheed Missiles & Space Co.:	104	2, 701	2. 805
Sunnyvale, Calif Huntsville, Ala	104 47	2, 701	2, 673
Lockheed-Georgia Co.: Marietta, Ga		264	264
Lockheed Aircraft Service Co.: Jamaica, N.Y	13		13
Lockheed Electronics Co.:	775		775
Houston. Tex. Hyattsville, Md.			′′8
Total	947	2, 965	3, 912

Note: This report reflects plant equipment and special test equipment in plant as of Nov. 30, 1969, as reported on NASA Form 1018.

NASA ACTIVE CONTRACTS OF \$100,000 AND OVER WITH LOCKHEED AIRCRAFT CORP. AS OF DEC. 31, 1969

Contract number	Lockheed division	Installation	Contract date	Completion date	Type of contract	Total estimated or target cost plus fee (thousands)	Cumulative obligations (thousands)	Cumulative accrued costs (thousands)
NAS9-5191	Electronics Co	Manned	September 1965	September 1965 August 1970 2	CPAF	129 671	\$53 627	\$50 086
	General electronic, instrumentation, and engineering support services—manned space flight programs.					10 (10)		
NAS9 5384	Electronics Co.	do	January 1966	do Januarỳ 1966 November 1970 2., CPAF	CPAF	50, 167	38, 581	38, 299
	Computer programing and operation support services—manned space flight programs		•					ì
NAS2-3500	ace Co	Ames	. April 1966.	. Ames April 1966 September 1970 CPIF	CPIF	2, 663	2.620	2.480
NAS3-8989	Aerobee rocket control system—sound- IAP experiment development programs.	- ewir	Fahruary 1968	lawis Fahruary 1968 Marrh 1970 CPAE	CDAF	3 003	3 003	, 670
	Agena adaptation, vehicle integration, management and systems contractor support—space electric rocket test program—SFRT II flight program and Agena pro-				ē	3	8	6
NAS3-8993	Missiles & Space Co	Pasadena	February 1969	Pasadena February 1969 April 1970 CPIF	CPIF	1 520	1 400	1 002
	icle integration, managemers support—Nimbus mission.					<u>!</u>	<u>;</u>	•
NAS3-11512		Lewis	November 1967 May 1970	. May 1970	CPAF	1, 330	1, 330	1, 323
	Design, development, labrication, testing and qualification of SERT II solar array and interface with an Agena launch vehicle—Agena procurement and SERT programs.							
NASW-1631		Manned	June 1967	June 1967 August 1970 FFP	FFP		1.250	1, 215
NAS6-1315	Integrated medical and behavioral laboratory— advanced systems development program.	Wallons	lanuary 1967	Wallons January 1967 Centember 19703 CPEF	ט פני	1 18		
	Operation and maintenance of range surveillance surveillance surcraft—network operations—T. & D. acquisition negations.				: ;	:	3	3
NASW-1388	sce Co. study of the X-ray background-sounding	Headquarters	Headquarters October 1966 July 1970.	July 1970	CPFF	995	662	26
NAS2-5168	California of Co. Linvestigation of slowed stopped retors—Beronautical vehicles ART program.	Ames	. November 1968	ors—Beronautical Ames November 1968 March 1971 CPFF	CPFF	836	836	501

See footnotes at end of table.

NASA ACTIVE CONTRACTS OF \$100,000 AND OVER WITH LOCKHEED AIRCRAFT CORP.1 AS OF DEC. 31, 1969-Continued

Contract number	Lockheed division	Installation	Contract date	Completion date	Type of contract	Total estimated or target cost plus fee (thousands)	Cumulative obligations (thousands)	Cumulative accrued costs (thousands)
NAS1-7573	Missies & Space Co. Development and validation of structural concepts for a hypersonic cruse vehicle wing structure—aeronautical vehicles ART and hypersonic range experiment pro-		Langley August 1967 April 1970	. April 1970	. CPFF	947	959	932
NAS1-8200	Rissia & Space Co. Missia & Space Co. Technical feasibility demonstration model of a long	ф	iong June 1968 August 1970	. August 1970	. CPFF	741	710	701
NAS5-10679	duration orbiting primate payload. Electronics Co. Wire key systems—equipment and components—	Goddard	components— Goddard November 1968 June 1970	June 1970	FFP		225	331
NAS-2-5419	California Co. Determine rotor response characteristics at high	Ames	. Ames May 1969 September 1970 FPP	September 1970	FPP		183	98
NAS2-4960	advance ratios—eeronautical vehicles ART program. Missiles & Space Co. Operational and launch support services for solar pointing. Aerobee rocket control system—sounding	фо	do June 1968 December 1970* CPFF	. December 1970°.	CPFF	. 525	479	302
NAS2-5270	rockets program. Missias & Space Co. Motion picture services—space sciences and applica-	op	do February 1969 January 1971 TM	. January 1971	TM.		104	45
NAS4-1556	tions programs. Georgia Co. Normal Tateral force control—supersonic aircraft	į,	July 1969	May 1970	CPFF	14	2	ಹ
80	New program. n study of a 30-foot flex-rib parabolio reflect ions technology satellites program.	Goddard	Goddard December 1969do CPFF	ор	CPFF	280	280	
NASS-948/ Electronies Quick ing fabruary Sciences Sciences Sciences Sciences Sciences Sciences & Sc	Electronics. Quek reaction off-center engineering, design, supporting fabrication, and technical writing support—space sciences and applications programs. Missiles & Space Co.	do.	do	April 1970do	CPFF	462	39.	8 8
	Ligni for mass specification of the continent, associated equipment and field support for Orbiting Geophysical Observatory program OGO-E mission.							

NASS_073	Missilan A Conta Co	-8	do March 1966 line 1971 CPFF	June 1971	CPFF	493	373	152
NASS-10392	Meropone idensity gage experiment for Ort physical Observatory program 0GO-F mission.	ş	18 Good do May 1967 October 1970 CPFF	October 1970	CPFF	354	282	280
	A 1-pound, low energy electron and proton aperiment for flight on application technology set				:	į	ļ	ł
NASS-11614	3	e	do September 1968 do CPFF	op	CPFF	102	102	45
	Research and development of an Inert fluid injection system for a solid propellent rocket—launch vehicle development SRT program.	\$ E B	Ames	May 1970	2000	8	108	2
	Study and production of polybenizimidazole laminates and billets—space vehicle systems SRT, planetary exploration SRT, and hypersonic ramjet experiment					1	<u> </u>	:
NAS2-5650	programs. Missiles & Space Co	ф	do September 1969 December 1970 CPFF	December 1970	CPFF	342	120	88
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NASW-1//4	NASW-1/14 Missiles & Space Co	Headquarters	neadquarters June 1968 March 1970 CPTP.	March 19/0		/17	286	8
NASW-1834	ce Co	ор-		June 1971	CPFF	210	210	8
NAS3-12025	ental study of spectral and spatial distribu rays—sounding rockets program. ce Co	Lewis	ition Lewis June 1968. September 1970. CPFF	September 1970	CPFF	152	152	ğ
Determi insulation	ne the thermal performance of multil systems—launch vehicle development				,			
NAS3-12033	Missiles & Space Co	do.	do January 1969 June 1970	June 1970	CPFF	320	320	8
Dig NAS3-12037	Liquid propellent thermal conditioning system— chemical rocket experimental engineering program. Missiles & Space Co.	9	do May 1969.	August 1970	CPFF	81	8	32
itized	ass supports for cryogenic tar SRT program.	100	December 1967	April 1970		116	116	2
	preliminary de tem—human fa		isign of an oxygen-	over my				1

nitrogen generation system—human factor systems SRT

NASI-9242. Missiles & Space Co

Control system—human factor systems SRT program.

See footnotes at end of table.

See footnotes at end of table.

Number of contracts.
Cumulative obligations (thousands).
Cumulative accrued costs (thousands).

NASA ACTIVE CONTRACTS OF \$100,000 AND OVER WITH LOCKHEED AIRCRAFT CORP.1 AS OF DEC. 31, 1969—Continued

Contract number	Lockheed division	Installation	Contract date	Completion date	Type of contract	Total estimated or target cost plus fee (thousands)	Cumulative accrued obligations (thousands)	Cumulative accrued costs (thousands)
NAS8-20369	Missiles & Space Co June 1970 CPFF Study of Saturn 18 debris risk hazard analysis—	Marshall	March 1966	. June 1970	. CPFF	253	253	202
NAS8-21022	Saturn Iba and V vehicle programs. Missiles & Space of Prediction of electrar density and collision cross	op	November 1966	do	. CPFF	137	137	121
NAS8-21459	Section in Saturit to North tandaus Space Ventice systems SRT Saturn 18 and Saturn V vehicle programs. Missiles & Space Co. Determination of gust penetration loads on Saturn	ор	June 1968	do June 1968do CPFF	CPFF	126	126	86
vehicles—S NAS8-24715 Missiles & Spac Spac Nuclear and early mission ana	wehicles—Saturn IB and Saturn V white programs. Missiles & Space Co. Missiles & Space Co. Muclear flight system definition potential flight test and early operational payloads—advanced studies mission analysis program.	ф	June 1969.	do June 1969 April 1970 FFP			787	981
Contracts under which work is cur 2 Final option. 8 Completion date of final option is I	Contracts under which work is currently being performed. Final option. Completion date of final option is December 1971.		Note: Total open 1, 1969: Number of co	Note: Total open (not fiscally complete) NASA contracts with Lockheed Aircraft Corp. as of Dec. 31, 1969: Number of contracts. Cumulative chilestine (finitesends)	te) NASA contr	acts with Lockhe	ed Aircraft Cor	p. as of Dec.

PREPARED STATEMENT ON MBT

Mr. PACKARD. I have a statement here on the tank. Perhaps it would be in order for me to read the statement as quickly as I can and then

proceed to your questions.

Chairman STENNIS. Pass these to the Senators very quickly, gentlemen, if you will. Do you want to read this statement or do you wish to highlight the different points? I don't want you to abbreviate this too much. If there is not time for it, we will just have to ask you to come back.

Mr. PACKARD. Mr. Chairman, it would be all right with me if you would prefer to put this statement in the record. I could just say a word or two, or maybe read the last few pages and not go through the detail. Of course I will be prepared to come back and discuss the mat-

ter before the committee.

Chairman Stennis. I believe really all the time we have today is on that basis. Maybe you could put it in and make the presentation of the highlights as you see it, and it will give us a chance to have questions. If we do not get to all of them, we can put them in the record.

If that does not prove sufficient, then we will ask you to come back.

Senator Symington. Mr. Chairman, I would ask approval to file questions. This is important it seems to me, because of its relationship with the German Government. I have been discussing it all at some length with the able German Ambassador, because the whole question involves the balance of payments. I would hope sometime we could have another hearing about it, and get into the question behind the questions. It involves our foreign policy in Europe and the balance of payments. As you know, Mr. Chairman, that has been on our minds for years.

Chairman Stennis. If we cannot handle it as I have outlined, why

of course we will have another sitting on it.

Mr. PACKARD. Mr. Chairman, I think it would perhaps serve the purpose if we picked up on page 11 of the statement.

Chairman STENNIS. We will place the statement in the record.

(The statement follows:)

In my appearance before this committee last September I commented at some length on the MBT-70 tank program. I indicated awareness of certain problems associated with the program and highlighted both complexity in design and complexity in management as contributing substantially to increased production costs. Clearly, insufficient attention had been given to possible tradeoffs, and cost effectiveness factors had not been adequately considered.

In order to provide a tank with marked superiority over current and anticipated enemy tanks, certain essential characteristics are needed in our future main battle tank; in my previous appearance I indicated that, in my judgment, these important features could be provided with a substantially simplified design. It was towards this end that I suggested the entire program be carefully reviewed with particular emphasis on the question of what simplifications should be made in the design itself, how the program management could be improved, and what other possibilities there might be to bring the program into a more satisfactory position from which we might move ahead. I am happy to report that substantial progress has been made toward this end.

We conducted the review in what I consider to be a logical, straight-forward manner. We initially examined the threat and then looked at courses of action

available to us to meet the threat.

The driving requirement for a future tank for the Army is the need for the US to support its NATO Allies against the threat of the Warsaw Pact ground forces over the next two decades. Our best intelligence estimates indicate that

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[deleted] Pack tanks in Central Europe [deleted] outnumber NATO tanks [deleted.]

[Deleted] There is no indication that this threat will decrease in size, but there is good evidence that it is being qualitatively improved.

There are three potential solutions to the problem of coping with the enemy's numerical tank superiority. The first and most straightforward would be to increase the number of current US tanks in the Seventh Army in Europe. However, because of manpower and monetary constraints, a force increase in Europe is not practical. While some of our studies indicate that it may be more cost effective to counter the enemy threat with a large number of tanks roughly comparable in quality, if not inferior, to the Soviets, it has never been the tradition of this country to send our soldiers against an enemy with inferior equipment. You can be assured that I am not going to recommend to this committee a course of action which compensates for quality equipment by accepting increased casualties among our soldiers. The second solution would be to increase the number of antitank weapons. However, even if a force could prevail in defense with anti-tank weapons alone, it must have tanks with which to counter-attack, to penetrate the enemy positions and to exploit such penetrations. Thus, a proper mix and balance between tank and anti-tank weapons is required. Accordingly, we must accept the third solution which is to provide our troops with adequate numbers of tanks possessing a marked superiority over current and anticipated enemy tanks. Such quality equipment assumes even greater significance now than in the past, in view of our current plans to reduce forces.

In order to provide this marked superiority a tank must possess certain capabilities, which our experience and analyses have clearly established. From these required capabilities can be determined the technical and performance character-

istics which must govern the tank design.

To perform the envisioned defensive and offensive tactical roles successfully in the face of Soviet and Warsaw Pact superiority in numbers, US tanks must be able to:

(a) Engage and Kill Moving Targets at Long Range.—This capability is particularly important during defense and delaying operations and in reinforcing

other antitank weapons.

(b) Engage and Kill at Medium and Short Ranges While Moving.—In any kind of operation it is likely that our tanks will eventually find themselves engaged at short range in a fast moving highly mobile situation. To perform successfully, tanks must be able to maneuver under fire, to bring effective direct fire on the enemy, and to load and fire while moving.

(c) Survive Under Fire.—This capability is obviously required in close com-

bat when tanks may come under fire unexpectedly from any direction.

(d) Operate at Night .- Soviet doctrine places great emphasis on night operations. Essentially all Soviet armored vehicles are equipped with active infrared devices to permit such operations. The ability to move and shoot effectively at night will therefore be necessary.

(e) Mobility to Get to the Point of Decision and to Permit Exploitation.—Regardless of the type of operation, history shows that victory normally goes to the commander who is able to concentrate superior combat power at the point of

decision and then have the speed and power to exploit success.

(f) Multiple Kill Mechanisms.—There are techniques such as spaced armor that can substantially reduce vulnerability to kinetic energy rounds. There are others that might reduce vulnerability to damage from penetration by shaped charges. It is very difficult to reduce vulnerability to both in a single design for a mobile vehicle. To prevent the opponent from finding an easy counter to our weapons it is desirable that our forces confront him with guns capable of firing both missiles and kinetic energy rounds.

From these needed capabilites, the following characteristics which a high quality tank requires were derived: missile, kinetic energy and shaped charge ammunition, highly accurate rangefinder, fire control computer, stabilization, improved suspension, automatic loader, improved armor, improved night vision,

and high HP-to-weight ratio.

Having derived the capabilities and characteristics needed, tanks which are currently in the inventory or available from development in the relatively near future were examined. I would like to discuss the findings, as they relate to the M60. M60A1E2 and MBT-70, briefly with you in the context of the desired tank capabilities just outlined.

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(a) Engage and Kill Moving Targets at Long Range.—The M60 performs rather poorly in this area due to the lack of a missile firing capability. Both the M60A1E2 and the MBT-70 are armed with missiles; accordingly, they are markedly superior to the M60 in engaging and killing moving targets at long range.

(b) Engage and Kill at Medium and Short Ranges While Moving.—Although the M60 has an excellent 105mm gun/ammunition combination permitting accurate fire at relatively short range targets from a stationary position, it does not not possess a stabilized gun, high quality suspension system, LASER range finder, high quality fire control, and automatic loader which are necessary for accurate engagement of targets while moving. The M60A1E2, on the other hand, will be fielded with an excellent stabilization system, LASER range finder and better fire control than the M60; however, it has neither an automatic loader nor a high velocity kinetic energy round necessary for effective close-in engagement of hard targets while moving. Although the M60A1E2 can shoot while on the move, the lack of an automatic loader makes reloading a difficult and hazardous task. Also the lower quality suspension system of the M60A1E2 makes accurate firing rather difficult. All of the features necessary to engage and kill targets at short range while on the move are included in the design of the MBT-70.

(c) Survive Under Fire.—This capability is enhanced by reducing to a minimum both the time that a tank is exposed to fire and the profile which it presents to the enemy. Obviously, such features as spaced armor reduce the possibility of penetration by a kinetic energy round if a hit is received. Because of the lower HP-to-weight ratios, poorer suspension systems, higher silhouettes, and lack of spaced armor of both the M60 and M60A1E2, they cannot move rapidly cross country (thereby exposing themselves for longer periods of time to enemy fire), they present a larger target to the enemy, and they do not enjoy the protection of spaced armor found in the MBT-70. Thus, their ability to survive under fire is markedly less than that of the MBT-70.

(d) Operate at Night.—The ability to operate at night involves not only being able to perform necessary functions during darkness undetected by the enemy, but also the corollary ability of being able to detect and destroy the enemy. The M60 is equipped with active IR night vision devices which are highly susceptible to enemy detection. The M60A1E2, on the other hand, has passive devices which cannot be detected but are of relatively limited range, thereby limiting the crews' ability to detect and engage the enemy. The MBT-70, using the latest technology, has excellent passive night vision devices which permit detection of the enemy at long ranges under very low ambient light conditions. This is an expensive but extremely important capability in view of the Soviet emphasis on night operations.

(e) Mobility to Get to the Point of Decision and to Permit Exploitation.—
The high HP-to-weight ratio and hydropneumatic suspension system of the
MBT-70 have enabled this vehicle to set cross country speed records at Aberdeen
Proving Ground, unequaled by any other vehicle we have ever produced. The
relatively lower HP-to-weight ratios and torsion bar suspension systems of both
the M60 and M60A1E2 tanks result in substantially less mobile vehicles.

A review of the above scoreboard reveals that the M60A1E2 provides us with impressive improvements over the M60 tank; however, the MBT-70 is the only tank that provides all the features which I consider essential for our main battle tank for the next two or three decades. Another significant advantage of the MBT-70 is that it has a three rather than a four-man crew needed for our present tanks. This feature, plus the smaller number of high quality tanks required for a given mission, has the obvious and desirable result of exposing fewer men to combat. These essential characteristics I have just discussed cannot simply be added to a tank built using technology in the 1950's, such as the M60 series. Complete redesign is necessary to integrate the desired features into an effective system.

It appears to me to be manifestly unwise to initiate a major effort to redesign the M60 series of tanks to include essential features which are already available in the MBT-70, although conservative product improvement of the M60 series tanks over the next few years appears desirable. Our recent experience with the M60A1E2 has served to confirm my views that a major redesign is not wise.

the M60A1E2 has served to confirm my views that a major redesign is not wise. In my initial inspections of the MBT-70 last May in Detroit and Milwaukee, I was impressed with its performance but felt that it was overly sophisticated and complicated, both of which would make the vehicle more difficult to maintain and more costly to produce. Accordingly, I asked the Army to review each feature for simplification or elimination in order to reduce cost and maintenance,

while at the same time retaining essential features. My December review revealed that the Army had made significant progress in this direction. The design changes which they proposed to me included the following: [deleted] while retaining the same level of armor protection; replacing a pop-up 20mm automatic cannon [deleted] using the missile system, environmental control units, and searchlight as kits; changing from a hydraulic to a manual snorkel system; replacing a digital computer with a simpler analog computer and substituting manual in lieu of automatic sensor inputs; replacing the double-cylinder hydropneumatic suspension unit with a single cylinder; [deleted].

Many other austerity actions are being considered to include acceptance of a 1250 hp air-cooled diesel, in lieu of the originally planned 1475 hp engine. When I first reviewed the MBT program, I discovered that major development effort was in progress on three different engines, a Continental 1475 hp air-cooled diesel, a DB 1500 hp water-cooled diesel, and a 1500 hp Lycoming gas turbine. I felt that these three parallel efforts were unnecessary and therefore wasteful. Because of the failure of the Continental to pass the 400-hour NATO test, we terminated further development effort on it in favor of the heavier German DB engine, which had demonstrated much greater reliability and had passed the NATO test. I also directed that efforts on the turbine be reduced to the lowest level consistent with maintaining a viable development program. Subsequently, Continental proposed derating their 1475 hp engine, which currently powers our six R&D pilots and four FRG pilots, to a level of 1250 hp to minimize technical risk and save money. The Army users consider the small degradation in power to be acceptable and the resulting power pack promises to be somewhat less expensive than the DB-Renk combination. (A Blue Ribbon Committee which recently evaluated the 1250 HP engine gave it high marks.) Accordingly, we now consider the 1250 hp Continental to be our primary engine candidate with the Lycoming turbine as a backup. Since we have the rights to the German DB, it can also be considered a backup to the American engines in the event of unforeseen difficulties. The ultimate engine selection will be based primarily on cost and performance considerations.

After thoughtful consideration of all matters discussed here today. I approved in early January 1970 an Army proposal to develop a modified configuration of the MBT-70 which retains the important features of the original design and eliminates those which are marginally effective. However, I feel that even further cost savings can be realized beyond that which the Army recommended in December. Accordingly, I have directed that this matter be pursued further during the next few months with the objective of firming up the redesign by July 1970. Recent studies indicate that it should be possible to produce this modified MBT, designated the MBT70/XM803, at an average unit production

cost of approximately \$600,000, in FY 1970 dollars.

Also as a result of my December review, I directed that steps be taken to improve the management of the program. It was clear to me that the joint nature of the program, made decisions most difficult and that reorientation of the program along the lines I desired would be impossible without a major change in the joint program. Accordingly, I directed that we take steps to establish unlateral technical decision authority and to terminate joint funding of the program as of 31 December 1969. My major objective in so doing, was to give the Army direct design responsibility for the program.

On 17 January 1970 the FRG agreed to a modification of the joint program which frees program and technical decisions from the need for unanimity, while retaining the benefits of potential component commonality between the two national versions of the tank. The FRG also agreed to terminating joint funding as of 31 December 1969. [Deleted.] These actions clear the way, from an inter-

national standpoint, for development of the US austere configuration.

I have asked the Army to examine the US Program Manager's management structure in-depth. This examination includes the size, organization and location of the Program Manager's Office, qualification of personnel; a review by an adhoc committee of technical specialists into each major development area: an analysis of the plan of contracting; and the adequacy of cost control and management information systems.

The resultant changes in management, both national and international, should provide us with the ability to assume the responsibility for added components that previously had been the responsibility of the FRG. The new agreement with the FRG permits us now to give our prime contractor. General Motors, full system responsibility. This we could do not do under the previous agreement.

The contract will allow much improved control of costs and schedule, and enhance our ability to anticipate problems and react on a timely basis. The management and technical changes which have been made or are contemplated, should assist materially in avoiding major cost growth and schedule slippages.

In summary, my evaluation has indicated the need for a quality tank for our armed forces. The MBT-70 program has been reoriented to provide for a substantially less complicated and less expensive vehicle with nearly equivalent effectiveness. Our management is being streamlined and simplified. I believe we are on the right track.

According, my recommendations are as follows:

a. That we proceed with the program as recriented, with design refinement of the XM803 to be completed by July 1970. (The December review answered most of my questions; I believe the remainder can be answered by July.)

b. That you authorize us to proceed with the program at a level of \$36M RDTE and \$41M PEMA for FY 1971. The PEMA funds will not be released until

the design of the final prototypes is firmed up to our satisfaction.

Gentlemen, I respectively solicit your support of the program. This concludes my prepared statement.

Mr. Packard. Let me go to page 11 because this essentially covers what our recommendations are and what we are really requesting in

the fiscal year 1971 budget.

After thoughtful consideration of all matters discussed here today, I approved in early January 1970 an Army proposal to develop a modified configuration of the MBT-70 which retains the important features of the original design and eliminates those which are marginally effective. However, I feel that even further cost savings can be realized beyond that which the Army recommended in December. Accordingly, I have directed that this matter be pursued further during the next few months with the objective of firming up the redesign by July 1970.

Recent studies indicate that it should be possible to produce this modified MBT, designated the MPT70/XM803, at an average unit production cost of approximately \$600,000, in fiscal year 1970 dollars,

assuming [deleted] tanks are produced.

Also as a result of my December review, I directed that steps be taken to improve the management of the program. It was clear to me that the joint nature of the program made decisions most difficult and that reorientation of the program along the lines I desired would be impossible without a major change in the joint program.

Accordingly, I directed that we take steps to establish unilateral technical decision authority and to terminate joint funding of the program as of December 31, 1969. My major objective in so doing, was to give the Army direct design responsibility for the program.

On January 17, 1970 the Federal Republic of Germany agreed to a modification of the joint program which frees program and technical decisions from the need for unanimity, while retaining the benefits of potential component commonality between the two national versions of the tank. The FRG also agreed to termination of joint funding as of December 31, 1969.

[Deleted.] These actions clear the way, from an international

standpoint, for development of the U.S. austere configuration.

I have asked the Army to examine the U.S. Program Manager's management structure in depth. This examination includes the size, organization and location of the program manager's office; qualification of personnel; a review by an ad hoc committee of technical spe-

cialists into each major development area; an analysis of the plan of contracting, and the adequacy of cost control and management in-

formation systems.

The resultant changes in management, both national and international, should provide us with the ability to assume the responsibility for added components that previously had been the responsibility of the FRG. The new agreement with the FRG permits us now to give our prime contractor, General Motors, full system responsibility. This we could not do under the previous agreement. The contract will allow much improved control of costs and schedule, and enhance our ability to anticipate problems and react on a timely basis. The management and technical changes which have been made or are contemplated, should assist materially in avoiding major cost growth and schedule slippages.

In summary, my evaluation has indicated the need for a quality tank for our armed forces. The MBT-70 program has been reoriented to provide for a substantially less complicated and less expensive vehicle with nearly equivalent effectiveness. Our management is being stream-

lined and simplified.

I believe we are on the right track.

Accordingly, my recommendations are as follows:

That we should proceed with the program as reoriented, with design refinement of the XM803 to be completed by July 1970. (The December review answered most of my questions; I believe

the remainder can be answered by July.)

That you authorize us to proceed with the program at a level of \$36 million R.D.T. & E. and \$41 million PEMA for fiscal year 1971. The PEMA funds will not be released until the design of the final prototypes is firmed up to our satisfaction.

That, Mr. Chairman, summarizes my recommendations. In the former pages we have outlined the need for the tank, why we think this is a preferable program to other courses that have been suggested and why we believe we should go ahead with the program on this basis.

Chairman Stennis. All right, Mr. Secretary.

Now, in the first place, you have a very firm conclusion, that this main battle tank is needed for the 1970's, that we do not have one now that could meet the demand.

Mr. Packard. Yes.

Chairman Stennis. I bring that up as a possibility. You reject the idea of just relying on the others?

Mr. PACKARD. I reject that idea. That matter is covered in the fore-

going pages of the report.

Chairman Stennis. I wanted to be sure it is covered. I have not had

a chance to read all of it yet.

Mr. PACKARD. Our rationale for supporting the decision is covered in the report and I will be prepared to come over and discuss that aspect as well as other aspects with the committee.

PROGRAM WITH GERMANY

Chairman Stennis. Have you totally severed this program now from the Republic of Germany?

Mr. PACKARD. The funding of the program is completely separated. We have preserved the opportunity for technical exchange. We have

preserved the opportunity to interchange the use of designs so that if we decide to, we can buy the engine, for example, from Germany. But, we have done the key thing which is to separate the decisionmaking responsibilities so that we can put a hard-hitting management team on this job. We do not have to consult with or be influenced by any of the German recommendations, although we can have them if we wish to ask for them.

Chairman STENNIS. Has the financial part of it been settled up to a

certain date?

Mr. PACKARD. We have achieved a cost settlement with the Germans

which I consider to be satisfactory.

There was a variation that ranged around \$10 or \$15 million. We settled it and all other issues I believe and the agreement is all signed, sealed, and delivered. It was all resolved without the need for any actual payment by either the United States or the FRG.

Chairman Stennis. And the future costs then as borne by us is for the tanks we buy. We buy our tanks and we are under no obligation

to them.

Mr. PACKARD. That is right.

We buy our tanks, and the program is under our control. We have the management team looking at this matter for some of the things we talked about earlier today. They are examining the design to be sure we are not putting unnecessary features on the tank. We hope to put in tighter management control, and to get the testing well underway before we make a large commitment to production.

We do want to get a little production tooling so we can properly test the tank. But in my view, the question really is whether we need a tank of this kind for the future, and I believe I have covered that

matter in the report.

Let me just summarize the final conclusion that I came to.

Some of the cost-effectiveness analyses indicated that we could achieve a capability with a larger number of less capable tanks. I concluded that while one might come to that conclusion on a cost-effectiveness basis, in this country we certainly do not want to commit ourselves to spending more on manpower for a larger tank force if we can get a superior tank which requires a smaller total tank force and still meets our requirements.

It was really on that issue that I decided we should not try and update one of our older tanks, even though a case could be made that one

might do this on a cost-effectiveness basis.

When it comes to the question of deciding whether you are going to lose 2,000 men in a battle versus 700 men in a battle, that to me is a more important consideration than some of the cost effectiveness analyses. That really was the deciding factor on it, in my opinion.

RELIABILITY OF MBT

Chairman STENNIS. It ought to be, I think, but we are also concerned about your having something that will work now. You cannot guarantee that of course, but you do think it is on the road now?

Mr. PACKARD. I think, Mr. Chairman, we can give you good as-

surance that it will work.

I would not recommend this program if I did not have confidence that this tank will work.

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Chairman STENNIS. Someone suggested that you tried to make it do too many things.

Mr. PACKARD. We have cut out some of those things.

Senator Symington. Mr. Chairman, I must leave. Could I ask one question?

Chairman STENNIS. Certainly.

Senator Symington. Mr. Secretary, could this statement you have made on this tank be declassified?

Mr. PACKARD. I think so. We will make an unclassified statement available for the public record.

Senator Symington. It would help a lot.

Mr. PACKARD. We were concerned earlier. We did not want it released because of our negotiating positions with the Germans, but that has been settled now.

We will provide an unclassified statement for the record.

Chairman Stennis. Do you have another question?

Senator Symington. No. Mr. Chairman.

Chairman STENNIS. Then you have the benefit of any of the German technique and they of yours, but there is no financial management connection anymore between you.

Mr. PACKARD. That is correct, we terminated the joint funding of the program as of December 1969.

ELIMINATION OF PROGRAM MANAGERS

Chairman STENNIS. I have been hearing about the main battle tank a long time. I have been hearing about those tanks that are in Detroit. I believe you call that the E-2. I have been hearing about the E-2 over and over every year, more and more money, more and more purchases, and still we have to rely mainly on the old tank.

What did you do about that? What is your management plan? And

does it extend to the other tanks?

Mr. PACKARD. Mr. Chairman, the question in a sense does extend to the other tanks.

We have not gotten into the details on those. For example, the management responsibility on the MBT program was so complex that we could not make a decision without getting a U.S. team and a German team to agree on it. It simply meant that the U.S. program manager really did not have much control; all he could do was address the questions to the various committees. It is my view that the best approach is to identify a person who is going to be responsible for the program. After he is selected—and it should be someone who has some experience—he should be given authority commensurate with his responsibilities and be backed up with the appropriate staff capability.

The Army has now agreed to this type of structuring of the program—and I am not going to review it in detail now because it is covered in my formal statement—but this is really the same idea of getting a good man in and holding him responsible, you must keep him there long enough and give him a good staff. But we should not design these things by committee, which has been a problem in a good

many cases in the past.

Chairman STENNIS. Is that military or civilian management you are talking about?

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Mr. PACKARD. This will be a retired military manager with the appropriate civilian and technical backup. General Luczak, the program manager, is a man of considerable military experience. He is now retired, and can be kept as the program manager as long as necessary.

Chairman STENNIS. All right, Senator Schweiker, I want you to

have a chance to ask questions. I call on you now.

TOTAL PROGRAM COSTS

Senator Schweiker. Mr. Secretary, with the \$600,000 per production unit and your R. & D. what will be the total package cost of the system and how many tanks do you get as you envision it now?

Mr. Packard. If you want, we can supply you a detailed schedule on

this which includes our estimates on development.

Senator Schweiker. If I recall correctly, we had to allocate [deleted] for research and the GAO report showed it was up to [deleted]. I just wondered if you had a rough indication.

Mr. PACKARD. This figure includes-

Senator Schweiker. That is production. I am talking research and development.

Mr. Johnson. The \$600,000 is the production cost estimate and the

R.D.T. & E. is now estimated at [deleted] million for the tank.

Senator Schweiker. The GAO said [deleted] million. Are we that

far apart?

Mr. PACKARD. I am not sure what the [deleted] million you cite refers to, but I believe it may include some advanced production costs. Senator Schweiker. I thought that was an evaluation as of that time in terms of the money spent.

Gen. Luczak. The [deleted] cited was the total R.D.T. & E. and the

PEMA costs for the tank program. It was not just R.D.T. & E.

Senator Schweiker. PEMA being what?

Gen. Luczak. Basically preproduction-type money in this particular instance.

Senator Schweiker. So how much total do we envision with the two together?

Gen. Luczak. The two together are around [deleted] million.

Senator Schweiker. You are confirming that figure?

Gen. Luczak. I am confirming that figure but not being totally R.D.T. & E. It includes R.D.T. & E. and preproduction costs, but no actual tank production costs.

Mr. PACKARD. I think we ought to give the total breakdown.

Senator Schweiker. How many do you intend to buy at this point? Gen. Luczak. [Deleted.]

Senator Schweiker. That was it originally.

Gen. Luczak. It originally was higher than that.

Senator Schweiker. Was it [deleted]?

Gen. Luczak. It was [deleted] a few years ago. We are now at [deleted].

Mr. PACKARD. The average cost of \$600,000 is based on the [deleted]

quantity.
Senator Schweik

Senator Schweiker. That is all I had, Mr. Chairman.

Chairman Stennis. All right, Senator.

Thank you very much.

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FUTURE OF TANK PROGRAM

Chairman Stennis. This is no simple matter, Mr. Secretary. I don't know, I am not trying to state that my ideas about it are better than the military, but money has been coming mighty easy here for several years, especially during this war, and this thing is just going on and on with the tank. Whatever you asked for you got, but this is seriously challenged now. I think it should be, but it is challenged on the ground that tanks are obsolete. Time has gone on and passed them by. Tanks are no longer used to destroy tanks. We have weapons here in this same bill that are guaranteed to knock out tanks. Of course, those things are disputed. I want you to enlarge a little further on what depth you went into in getting at this entire matter, and then coming up with your decision. I think the cutting away from the German joint venture was more incidental. It is important but it doesn't go to the main question at all.

Do we need to emphasize the tank of the future? Did you consider using those we have or just adding to them? Did you go into all that thoroughly and give it your personal judgment before reaching

this conclusion?

Mr. PACKARD. Yes, Mr. Chairman. I can just read an excerpt here from my statement to give you some idea starting on page 2.

There are 3 potential solutions to the problem of coping with the enemy's numerical tank superiority. The first and most straightforward would be to increase the number of current U.S. tanks in the Seventh Army in Europe.

Then we discuss the matter of cost effectiveness.

The second solution would be to increase the number of antitank weapons. However, even if a force could prevail in defense with antitank weapons alone, it must have tanks with which to counterattack, to penetrate the enemy positions and to exploit such penetrations. Thus, a proper mix and balance between tank and antitank weapons is required. Accordingly, we must accept the third solution which is to provide our troops with adequate numbers of tanks possessing a marked superiority over current and anticipated enemy tanks. Such quality equipment assumes even greater significance now than in the past, in view of our current plans to reduce forces.

So essentially we have looked at those three alternatives. One, just to increase to a large extent the numbers of our current tanks. A second was whether we could depend upon antitank weapons alone. Essentially the recommendation here is that we do place a large reliance on antitank weapons, but also utilize a smaller force of more capable tanks. That is essentially the solution we are recommending, and I think we have some people here who could discuss the military tactics with you. I am not an expert on this matter but this seems to me to be a very logical and appropriate solution to this question.

SOVIET TANK EVALUATION

Chairman STENNIS. What do you know about the tanks the Soviets have? We all know that they emphasize numbers but does their best tank compare with our arsenal of tanks?

Mr. PACKARD. We have considered that question, and we have on page 4 here a summary of some of the capabilities that are necessary.

One of them is the ability to engage and kill moving targets at long range which essentially says that you need some missile capability in the tank force. Another is the ability to survive under fire.

It is possible that they are moving to some missiles in their tanks, and Soviet doctrine puts great emphasis on operation at night. Essentially all Soviet armored vehicles have active infrared equipment. We have outlined those details here. As I say, I am not an expert in this matter. We can have someone brief you in more detail if you wish to have it done, or we could respond to written questions.

WORLD WAR II STATISTICS

Chairman STENNIS. You seem to have gone into it. They have figures here from World War II, and that is a long time ago, that of the tanks knocked out by the allies during World War II, only 14 percent were knocked out or killed by other tanks. Are you familiar

with that statistic?

Mr. PACKARD. I am not familiar with that particular statistic. However, it is my impression from the study I have made of this, that although there are other efficient ways to kill tanks, one of the purposes of the tank is to get in and exploit a breakthrough, and that is one of the things you can't do with these other kinds of weapons as effectively as you can with tanks.

PURPOSE

Chairman Stennis. What is the primary mission of this tank? Mr. PACKARD. Well, the primary purpose is to play a significant role with the ground forces in engagements of the type we are likely to encounter in the NATO theater. That is really I think you can say the driving force in this. If you look at the use of tanks in the Vietnam theater, the Sheridan is quite adequate for that type of operations. You don't need a main battle tank for that kind of a situation. So the main battle tank is really for ground force engagement with Soviet type forces or forces of that caliber.

Chairman STENNIS. And as I understand it, when you have a break-

through, these tanks go in and try to dominate and exploit.

Mr. PACKARD. They can go in around and behind the enemy lines and cause tremendous amounts of disruption. That is why speed, agility, and ability to move are important. It is also important to have this agility and mobility because if there is a weakness in the enemy line you can move your forces and exploit that weakness quickly. As I say, I am not an expert on this, but we did look into these questions rather carefully.

Gen. Luczak. Colonel Baer is here.

Chairman Stennis. Colonel Baer, we are glad to have you back. Do you want to come up to the table and make a statement?

Colonel BAER. I think Mr. Packard has proven himself to be quite a

tank expert in his testimony, sir.

Chairman STENNIS. You made a statement here the other day to us.

Colonel BAER. Yes, sir.

Chairman Stennis. Of course that is a part of the record already. If there is anything additional you want to say, just proceed.

Colonel BAER. Sir, I would only add to Secretary Packard's statement on the key role that the tank plays in the exploitation, which is an important part of defensive warfare, but is sometimes overlooked. As mentioned, the attacker has the advantage of being able to concentrate his forces at the time and place of his choosing. Antitank weapons, being relatively fixed, must of course be spread out in order to cover the broad front over which we may expect attack. Therefore his concentration provides him with the opportunity to penetrate our defenses. We must then have the mobility and capability to respond with an effective force quickly and at the time and place at which we believe the decisive action will occur.

PREPARED QUESTIONS FROM SENATOR STENNIS

Chairman Stennis. I am sorry to interrupt but we have a rollcall over in the Senate and I will have to go. If you want to file an additional statement, you can do so. Gentlemen, I thank you.

(Questions submitted by Senator Stennis. Answers supplied by the Department of Defense.)

Question. Mr. Secretary, as you know, this MBT-70 program was begun in 1963 as an \$80 million joint development and as a replacement to the M-60 tank. The replacement was to take place in the late 1970s. Aside from the cost elements the tank is now 6 to 8 years late. Through 1970 \$214.4 million for R. & D. and \$50.7 million for production base support has been funded for the MBT-70.

The total request for fiscal year 1971 is \$77 million, consisting of \$41 million in production base support and \$36 million in research and development. With this background I would like to raise the following questions.

Are there any funds for the development of the MBT-70 not included in the current submission?

Answer. No funds in the Army's fiscal year 1971 budget submission are for development of the main battle tank, other than the total you have just identified. In future years, through fiscal year 1977, it is now estimated that additional R.D.T. & E. funding in the amount of \$100.6 million will be required for this program, which includes development of three companion vehicles (a recovery vehicle, an armored vehicle launched bridge, and a combat engineer vehicle).

Question. Last year production was scheduled for [deleted] and it was indicated that some additional time would be required because of the change in the program. Under this current revised program when would production begin?

Answer. Under the reoriented development program, first production is currently scheduled to begin in December 1975.

Question. Testimony before the committee last year stated that the MBT would cost \$600,000 each. Mr. Packard's letter quotes an \$850,000 cost for last year's version and (deleted) for today's austere version. We are now being asked for funds for an austere tank that is more expensive than the original MBT. Could you explain the dollar variations?

Answer. The unit cost figure provided last year was an early estimate for the joint tank as then configured, derived from the now completed producibility and cost reduction study. In addition to being a preliminary product of the then incomplete study, that estimate already included many design changes from the \$850.000 R. & D. version and was computed on the basis that total procurement would be [deleted] tanks and that production would be at the rate of [deleted] tanks per month. Unit cost estimates are very sensitive to both of these last two factors, and our current estimates change these to [deleted] tanks at [deleted] per month. Also the cost figure provided last year was in terms of fiscal year 1968 dollars, rather than the Fiscal Year 1970 dollars of the present figure.

Question. What changes have you made to reduce the price?

Answer. The following changes account for the cost reduction:

(a) Change in armor material, design and fabrication; and (b) relocation on the missile transmitter.

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(c) Use of a [deleted] in lieu of a 20-80 mm, cannon.

(d) Provision of missile guidance and control equipment, auxiliary power unit, and searchlight as kits only for those tanks requiring them.

(e) Use of a manual system for fording preparation in lieu of the previous power-operated system.

(f) Simplified ballistic computer.

(g) Use of a single-actuator hydropneumatic suspension system in lieu of the previous double-actuator system.

(h) Use of a manual rather than an automatic fire extinguisher system, and

(i) elimination of [deleted].

(j) [Deleted] at both the gunner's station and the commander's station.

(k) Use of the U.S. Continental engine and Allison transmission in lieu of the German power package.

Question. Has the capability been reduced as a result of these changes?

Answer. The effect of these changes on overall system performance is shown below:

(a) Change in hull material—ballistic protection level is maintained at the expense of a small weight increase. The degradation is slight.

(b) Relocation of missile transmitter—[deleted].

(c) Use of [deleted].

(d) Missile system, APU and searchlights as kits—there is no immediate effect because all vehicles that would be engaged in combat will be initially provided with kits, as required.

(e) Manual system for fording preparation—crew members must dismount to prepare for fording, as with all other current tanks. Overall degradation is slight

(f) Simplified ballistic computer—[deleted].

(g) Single actuator hydropneumatic suspension—no known degradation.

(h) Substitute manual fire extinguisher for automatic—crew members must manually actuate the system as with all other current tanks.

(i) [Deleted.] The capability for installation at a later time will be retained.

(j) Commander's and gunner's [deleted] modification—no degradation.

(k) Use of Continental engine and XHM 1500 transmission—vehicle top speed reduced from 44 to 40 mph, resulting in a corresponding slight reduction in mobility and agility.

Ouestion. Have you terminated the joint development program with Germany?

Answer. No, the joint relationship has been revised to permit unilateral technical decisions by each nation and to terminate joint funding as of 31 December 1969.

Question. What is the current U.S./German relationship in the continuing development program?

Answer. Under the revised joint program, the two nations will continue to exchange information and to maintain commonality of components to the maximum extent commensurate with national interests.

Question. Germany is now developing a non-missile tank as their primary main battle tank.

Why have they changed their mind on MBT-70?

Answer. Our information is that the Federal Republic of Germany will (deleted). They perceive the threat in the same way that we do. There is no significant difference on this point. The reason for their (deleted) approach is two fold. The first aspect is purely budgetary, a matter of money. The second is one of philosophy. In the summer of 1969, the German Army developed doctrine in line with a restructured Bundeswehr which calls for (deleted). In addition to differing some what from the Germans on how to meet the threat, U.S. intent is to provide a tank which maximizes survivability of the individual soldier and of the force as a whole as combat effective elements. The U.S. tank is one designed to meet our NATO commitment with the most effective item and the minimum deployment of U.S. manpower.

Question. Is Germany going to buy any of the MBT-70 and have they made a Arm commitment?

Answer. Although we know of no firm commitment for German procurement of the main battle tank, our last understanding is that they planned to field (deleted).

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Question. Are any other NATO countries intersted in the MBT-70 and are there Arm commitments?

Answer. Other NATO countries are interested in the main battle tank, and a full briefing has been made available to them on an annual basis; however, the new U.S. design has not been discussed with countries other than the Federal Republic of Germany. No firm commitments have been made for procurement of the main battle tank by the other NATO nations.

Question. What is the Warsaw Pact tank threat against which the MBT-70 must compete?

Answer. The information is classified and was retained in the committee's files.

Question. You state that (deleted) tanks will equip the European positioned force and a share of the training base.

How many tanks do we now have in Europe? How many tanks do each of the other NATO countries have?

Do you plan to reduce the number of U.S. tanks in Europe when the MBT-70 is introduced?

Answer. The U.S. has (deleted) tanks in Europe. Of this total (deleted) are assigned to units actually stationed in Europe, (deleted) are prepositioned equipment for the dual-based REFORGER units, and (deleted) are (deleted). Of the remainder (deleted) are assigned to the training center Vilsek, (deleted) are in Berlin, and the others constitute a maintenance float and a (deleted) war reserve.

Medium tanks from other nations which will be available to the NATO Central

Region at M-Day are: (deleted).

Our current plans are to replace the M60 series tanks in Europe on a one-forone basis with the MBT-70/XM803. However, the total number of U.S. tanks required in Europe will decrease to (deleted) when distribution of the M551 Sheridan is completed. This reduction results from replacing the M60 tanks now being used in the armored cavalry units pending the availability of the Sheridan armored reconnaissance vehicle.

In addition, the current MBT-70/XM803 program does not call for (deleted).

Question. NATO, as far as the U.S. is concerned, is primarily a defensive posture. Based on available intelligence, is the Russian doctrine and forces oriented toward offense or defense in Europe?

Answer. The question of whether Russian doctrine and forces are oriented toward offense or defense in Europe is currently under review by the intelligence community. Pending the completion of that review, there is no agreed upon answer to the question.

Question. The SHILLELAGH missile does not meet the initial Qualitative Material Requirements. Please provide a breakout of the initial operational requirements indicating those requirements which SHILLELAGH does not meet. What is being done to correct the deficiencies?

Answer. The Army's requirements were established in 1959 (OCTM 37039, 2 Apr 59). The description of each characteristic has been condensed to avoid lengthy wording. Current estimate of demonstrated performance is also shown.

1. CONFIGURATION CHARACTERISTICS

Requirement

- (A) Compatible with present and future vehicles.
- (B) Lightweight as practicable without compromise of performance.

Current Status

Met the requirement. System adapted to Sheridan and M60A1E2 and planned for MBT-70.

Met the requirement. Extended range MSL-61.5 lbs.

2. PERFORMANCE CHARACTERISTICS

Requirement

(A) Fire at targets [deleted] above and [deleted] below horizontal extension to [deleted] above desirable.

(B) Operation by one gunner controller and served by one loader.

- (C) 1 Rate of loading must not restrict rate of aimed fire. Rate of fire should be on order of [deleted] missiles per minute at varying ranges up to [deleted] meters.
- (D) system should be simple to operate; excessive training not required; special selection of crew members not desirable.

(E) Capable of destroying heaviest armored vehicle likely to be encountered. [Deleted.]

(F) Same basic missile with appropriate warheads shall be employed efficiently, economically, and effectively against unarmored targets, including personnel, material and field fortifications. It is mandatory that means of firing, preferably a ballistic type high explosive projectile be provided.

(G) Hitting Ability:

(a) System must produce significant improvements in engagement capabilities by independently or collectively increasing effect; decreasing time to hit; increasing the delivery accuracy without prejudicing practicality of system.

(b) Range—near [deleted] meters desired.

(H) As much capability practicable when either vehicle or target or both are moving, and during hours of darkness or limited visibility.

 In event new turret is required. armor protection of turret shall be protected from small arms fire. equal to vehicle. Exterior components of missile system should be protected against small arms projectiles and artillery shell fragments.

(J) Preoperation checks and other steps preparatory to firing must be held ational checks not mandatory. to a minimum.

Current Status

Met the essential requirement. [Deleted] not capable with present vehicle.

Met the requirement. The system can be operated by one gunner and one loader.

Requirement not met. Rate of fire is [deleted] missiles per minute. TECOM assessed performance at [deleted] rounds aimed fire per minute and recommended requirement for [deleted] missiles/minute be waived.

Met the requirement. No special selection of crew is necessary.

Met the requirements. System will defeat [deleted].

Met the requirement. Missile designed for maximum efficiency and effect against armored targets, the [deleted] warhead may provide concussion on unarmored targets. Antipersonnel ballistic round also provided as conventional ammunition.

Met the requirements as follows:

- (a) (1) Overall mission reliability is [deleted].
- (2) Time of flight-[deleted] to max.

(b) [Deleted] meters.

Met the requirements with following qualification:

- (1) Accuracy moving targets at varying ranges is [deleted].
- (2) Firing at night accomplished by target illumination.
- (3) System does not have fire-onmove capability. Requires stabilization of tracking and command optical paths.

Met the requirement. Transmitter

Met the requirement. Prefiring oper-

¹ No action is presently being taken to improve the [deleted]. A program is underway [deleted]. A separate improvement to add filters to the missile beacon for improved performance during night firing is also underway.

3. DURABILITY AND RELIABILITY CHARACTERISTICS

Requirement

System shall be capable of firing greater than organizational mainte- nance. nance and [deleted] missiles and [deleted] of operation without requiring major overhaul or replacement of maior components.

Current Status

Met the requirement since defective [deleted] missiles and withstanding black box can be replaced in event of [deleted] of vehicle operation with no G&C failure by organizational mainte-

4. TRANSPORTABILITY CHARACTERISTICS

Requirement

Should be transportable by rail. Missile system shall not be adversely af- transported by rail, air, and truck. fected in cases when vehicle with system mounted is transported by air.

Current Status

Met the requirement. System can be

5. ASSOCIATED EQUIPMENT CHARACTERISTICS

Requirement

(A) Ammunition stowage-compatible with parent evhicle.

(B) [Deleted.](C) Any optical components which may become damaged should be readily replaced by crew from inside vehicle.

Current Status

Met the requirement. Missiles stowed on carrying vehicle.

[Deleted.]

Met requirement. Tracker can be replaced from iniside vehicle. Transmitter not included (as an optical viewing device).

6. SPECIAL CHARACTERISTICS

Requirement

Current Status

Environmental and terrain requirements are the same as for vehicle.

Requirement not met as the low temperature operation of the missile degrades at [deleted].

Question. Historically, about 15 percent of tank usage has been against other tanks; however, the current premise is that in a NATO situation, tank vs. tank engagements could be as high as [deleted] percent.

It would appear that in a NATO defensive situation with only two logical approach routes, a [deleted] percent tank vs. tank usage would occur only if we choose a tank vs. tank tactic. What evidence is available to support a statement that a tank is the most effective means of countering enemy tanks?

Answer. The statement that "the best antitank weapon is another tank" dates back to World War II. As is characteristic in military history, the success of the tank in its primary roles of assault and exploitation led to an evolution of weapons designed to defend against it. Antitank weapon system evaluations began even before World War II and resulted in the continuing search for a weapon with which the infantry could defeat tanks. The 37mm and 57mm guns, organic to U.S. infantry regiments in World War II, were examples of light, towed antitank guns. They were not completely successful because the evolution of the tank led to designs that were nearly immune to fire from weapons light enough to be manhandled into infantry positions. Another partially successful line of attack was the tank destroyer, a self-propelled medium caliber antitank gun. The evidence of World War II indicates that when it could be brought into the battle supported by friendly infantry, the tank destroyer could achieve very favorable results. However, the necessity that it be mounted on an armored, tracked vehicle made it infeasible for integration into the rifle companies or battalions. Therefore, U.S. doctrine developed in such a way that rather than have two separate vehicles the tank assumed the role played by the tank destroyer.

Since WW II, the shaped-charge projectiles of recoilless guns and rocket launchers have provided the infantry with the punch necessary to penetrate the tank's armor. However, both of these weapons lack accuracy and have relatively short effective ranges as compared to current tank guns. It has not been until the recent development of antitank guided-missiles that we have been able to provide the infantry with a weapon that has the range and accuracy of tank mounted systems.

Another point that must be considered about the tank in the antitank role is the individual tank crewman's knowledge and understanding of armor operations. Because he works with his own tank and the other tanks in his unit, he knows what to expect when engaging an enemy tank. Although we spend considerable time in training infantry to work with tanks, the ordinary infantryman will never have the knowledge the tanker accumulates from his day-to-day work.

Thus the statement "the best antitank weapon is another tank" must be understood in its full context. First, our inability in the past to provide a fully satisfactory infantry antitank weapon, and second, the knowledge of the tank crewmember about tank operations.

Question. An August 15, 1969, study by Systems Analysis stated that based on threat analysis, the T-62 (115-millimeter gun) was believed to be a reasonable, perhaps high threat, projection for an analysis to determine the proper MBT. The Summary Report MBT-70 attachment to Mr. Packard's letter states (deleted).

Does the tank have a convention gunf If so, what size and how does it compare to the 105-millimeter M60A1 gunf

Ansicer. The information is classified and was retained in the committee's files.

Question. It has been reported that the 152-millimeter gun is slightly less capable than the 105-millimeter gun on the M60A1. Have there been comparative tests? Describe the tests and the results.

Answer. These reports are substantially correct, when limited to the conventional-round capabilities of the gun/launcher found on the Sheridan and the M60A1E2 tank, principally because these weapons are not able to fire high-velocity kinetic-energy rounds. In contrast, the gun/launcher on the Main Battle Tank has been lengthened and strengthened so that, in addition to the Shillelagh missile and all of the conventional rounds fired by the earlier vehicles, the Main Battle Tank can also fire a new 152-millimeter kinetic-energy round. The firing portions of the Main Battle Tank test program have not yet progressed to the point at which comparative testing with other systems is possible; however, preliminary data indicates that the Main Battle Tank will equal or surpass the M60A1 in accuracy and lethality.

PREPARED QUESTIONS FROM SENATOR SMITH

(Questions submitted by Senator Smith. Answers suppled by Department of Defense.)

Question. Secretary Packard, in your letter of January 15, 1970, to the chairman of this committee, you say, "Nevertheless, the M60A1E2 is at best an interim improvement." With the exception of the SHILLELAGH, the E2 does not seem to offer a significant advantage over the M60A1. You have asked for \$12 million in 1971 to continue study of the technical problems and there is no guarantee that still more money will not be required. The fielding of the E2 will require, to some extent, another logistic support system.

Does the E2, as an interim improvement, provide sufficient advantage to warrant continuation of development effort?

Answer. The training and logistical impact of the introduction of M60A1E2 will be minimized by the fact that the M60A1E2 uses the SHILLELAGH weapons system which is common to the Sheridan, and heassis and power-train which are similar to the M60A1 tank.

The Army feels that the addition of the SHILLELAGH weapons system to the M60A1 chassis in itself provides sufficient advantage to warrant continuation of the M60A1E2 tank development.

The M60A1E2 tank also offers improvements in ballistic protection for the crew, and passive rather than active night vision equipment. The turret and tank commander's cupola can be independently operated in fully stabilized modes.

The laser rangefinder and ballistic computer combine to upgrade the fire control for the conventional 152-millimeter ammunition.

l'ians are to replace [deleted] M60 or M60A1 tanks in the tank platoons of the Europe-positioned tank battalions with [deleted] M60A1E2's. The SHILLELAGH missile of the M60A1E2 will provide a platoon with a long-range antitank capability. At shorter ranges the SHILLELAGH will be complemented by the kinetic-energy round of the M10/M60A1 tanks. The M60 and M60A1 tanks replaced by the M60A1E2's will be redistributed to other Army units to continue the phase-out of the older M48 series tanks from the inventory.

If the Army's plan to fix the M60A1E2 tank is approved, \$120.1 million will be required to fix, retrofit and produce [deleted] tanks. With regard to this \$120.1 million, \$9.8 million is available and being used from fiscal year 1970 and prior year funds and \$12.1 million is being requested in fiscal year 1971, thus, a balance of \$98.2 million will be required in the out-years fiscal years 1972-1974. The total PEMA program is \$349 million through fiscal year 1974 (\$228.9 million in fiscal year 1969 and prior year funds plus the above mentioned \$120.1 million). The resultant average production unit cost to provide [deleted] M60A1E2 tanks is estimated at [deleted].

In considering the average production unit cost of the M60A1E2 [deleted] the relevant cost is the estimated [deleted] per tank required to fix, retrofit, and produce [deleted] tanks since this is the true remaining out-of-pocket cost. The balance of [deleted] of the average unit cost represents past PEMA costs, of which only a small percentage is recoverable.

With an additional PEMA investment of [deleted] per tank, the Army believes it can provide a missile firing tank to meet its operational requirements pending delivery of the MBT-70.

Question. Mr. Secretary, the thing that concerns me is huge amounts that have been spent in the development of the MBT-70 and the M60A1E2.

Now that you have deleted many refinements from the main battle tank, I am wondering how much better it will be than the A1E2, if and when it goes into production.

It strikes me that the two tanks are becoming competitive and it may even be that the threat won't exist in the lae 1970's.

Would you comment on these observations?

Answer. While the M60A1E2 will provide significant improvements over the M60A1 tank, such as the SHILLELAGH missile, laser rangefinder, passive night vision, and gun stabilization, it will still lack a kinetic-energy round and its shoot-on-the-move capability will be limited by the lack of an automatic loader. The modified MBT-70 is designed to possess all of these capabilities. In addition, the MBT's superior suspension system and increased engine horsepower would provide better speed and mobility when moving cross-country. This higher speed, plus the MBT's lower silhouette and improved armor protection, should decrease its exposure to enemy fire and thereby increase its survivability on the battlefield. At night, the capability of the MBT to engage targets in either the passive or active mode is expected to be about twice that of the M60A1E2. Another highly significant improvement in the MBT is that it will require only a three-man crew, and therefore, will reduce the number of men exposed to tank combat. Thus, even after we have deleted many of the refinements from the MBT-70, it should still be clearly superior to the M60A1E2. The M60A1E2 is being developed to provide the long range capability of the SHILLELAGH missile to our Europe positioned tank units pending the availability of the MBT-70. Once the MBT is fielded, the M60A1E2 will be redistributed to Europe-oriented units located in the U.S. and can be expected to perform many years of service.

With regard to the second observation that the threat won't exist in the late 1970's, it should be pointed out that since World War II, the Soviets have maintained large, tank heavy ground forces and have not hesitated to use them in situations such as Hungary and Czechoslovakia. The Soviets are continuing to produce large numbers of modern tanks each year, and there is no indication that they will abandon the concept of employing large mechanized forces. Thus is appears that the threat in Europe will continue to exist for many years to come.

Question. Mr. Secretary, countering the tremendous Soviet armored threat seems to be the primary justification for this MBT-70. Yet from testimony that we have had, the tank is primarily an offensive weapon, and such weapon systems as TOW and DRAGON will be the backbone of the defensive effort. Secretary Resor pointed out that the limited agility of the tank dictates that it cannot occupy many of the best defensive sites.

Do the roles of a tank, other than anti-tank, justify such a complex and

costly system as MBT-70?

Answer. It should be pointed out that because of the size of the Warsaw Pact armored threat, all available weapons with an antitank capability will play key roles in the defensive effort in Europe. In the defense, tanks will be held as a mobile reserve so that they can be used as the principal weapon in counterattacks to restore friendly positions. This role requires the same characteristics as the offensive roles of the tank and cannot be performed by ground mounted antitank weapons. Another role of the tank in the defense is to reinforce the fires of other antitank weapons. This role puts less emphasis on movement, but provides a greater opportunity for the tank to use its armament at long range. Finally, the tank in the defense is used as a primary weapon in delaying operations. In this role, the tank uses its long range firepower to disrupt and slow the enemy advance, and then uses its mobility and armor protection to retire safely to a new delay position. Thus it can be seen that the defense of Europe will be a team effort with all available weapon systems playing key roles.

During offensive operations, the tank participates with the infantry in the assault against enemy positions. During the assault, the tank's armor protection, and its ability to move rapidly cross-country, increase its ability to survive. When the assault succeeds the tank is the principal weapon used to continue the attack deep into the enemy's rear area during the exploitation. For this role it is necessary that the tank move long distances without refueling and operate for long periods with minimum resupply and maintenance. The importance of the tank's varied roles in the defense plus its offensi e capabilities more than justify

the development of the MBT-70.

Question. Several of the changes that the Army proposes to reduce the cost will require redesign and further development.

How can you spend \$41 million in procurement funds in fiscal year 1971 when the design will not be finalized until much later?

I had hoped you were putting a stop to concurrent development and production.

Answer. The \$41 million for Fiscal Year 1971 reflects the amount of funds that must be obligated to maintain continuity and to assure completion of the Advanced Production Engineering (APE) Program as scheduled. The Fiscal Year 1971 APE program is a part of the continuous five-year effort. Sufficient data has been gathered and analyzed from the research and development program to warrant the continuation of the APE effort. Even though the project manager has been given until June 1970 to determine the final design changes, the MBT-70 program has demonstrated a complete system with sufficient commonality between the first generation (R&D) and the second generation (APE) vehicles to justify continuation of the program. This \$41 million effort will insure a logical continuation of the MBT-70 program culminating in the production of the vehicle now scheduled to begin in December 1975.

The new austere configuration consists of many subsystems which are similar to those already developed (e.g., hull and turret armor system, power train system, gun-ammunition system, track and suspension system, auto-loader system). The production of these subsystems requires considerable preliminary APE effort in such areas as engineering layout, detailed drawings, procurement of

hardware, and the design of special machinery.

The concurrent development and production features of the program have been eliminated to a large extent by the Department of the Army's rescheduling of the program. Albeit, a degree of interface must be maintained between the RDT&E and APE efforts to insure the orderly transition of knowledge and engineering effort. Any serious interruption in this exchange of information is done at the risk of incurring additional expense and further slippage of production.

The FY 1971 Advanced Production Engineering tasks are shown in the chart below. These costs reflect the best estimates for the cost of the work required to maintain program continuity. There are eight prototype vehicles included in the total APE program, and these vehicles are required by [deleted]. It is considered prudent to continue the APE program through 1971. Any delay now will lead to further slippage of the advanced production engineering effort and consequently result in an undesirable slippage of the overall program.

MAJOR TASKS	Bstimateo amount (dollars is millions)
1. Primary vehicle	\$27.3
(a) Hardware	
This consists of 11 subtasks and involves provision of end	
item equipment for continued APE effort on the major vehicle	
structure components and systems.	
(b) EngineeringProvides engineering on vehicle components for APE	(6.5)
program.	
2. Vehicle and laboratory test	1. 4
Provides APE testing effort on fire control, automotive and arma-	
ment systems.	
3. Integrated logistical support	2. 0
This consists of 9 subtasks and involves continued APE effort in	
publications, maintenance engineering, tools, repair parts, packag-	
ing, and provisioning.	
4. APE program-product assurance (PA) activities	1. 95
This consists of 7 subtasks and involves continued APE effort	
reliability, quality assurance, value and human factors engineering	g.
5. Inspection of equipment (design and fabrication)	1.0
6. Program management	1.3
This consists of 5 subtasks involving system and configuration	n o
management.	
7. Management data	0. 13_
8. Engineering data	0. 285
9. System engineering Management/Systems Engineering	
10. System test and evaluation	
11. Gun/launcher	
Provides for continuation of technical data package (TDP) f	or
the XM1150E8 gun/launcher.	4.0
12. Ammunition	1. 2
Provide for the initiation of the work on the TDP for t	he
XM578KE round.	
13. SHILLELAGH	1.6
Provides for verification of work on the SHILLELAGH missi	le
system.	
14. Other in-house	0, 725
Question. Mr. Secretary, the Army has spoken of the requirement to	grow the
IBT-70 by adding capabilities to meet emerging threats.	,
It appears that the initial insectment may only be the heginning of	the nro

It appears that the initial investment may only be the beginning of the program and that we will be asked continually for funds to upgrade a basic tank. Will this austere tank meet the requirement of the 1980's, or will it be obsolve?

Answer. It is true that occasionally during the post-1970's the Congress can expect to be asked for funds to product improve the MBT-70/XM803. In the development of the MBT-70, we have pushed the state-of-the-art, as we know it, to give us a qualitative advantage over the Soviets. However, the Soviets certainly have the technical know-how to make improvements in their tank and autitank systems. Therefore, we are building into the MBT-70/XM803 a vast potential for product improvement, so that as new technological breakthroughs occur they may be applied to the tank. This potential should enable us, through product improvement, to keep the MBT-70/XM803 from becoming obsolete during the 1980's and permit us to maintain our qualitative superiority over the Soviets.

COMMITTEE RECESS

(Whereupon, at 12:30 p.m., the committee was recessed to reconvene at 2 p.m., of the same day.)

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(Afternoon session, 2:10 o'clock, Tuesday, March 10)

Present: Senators Stennis (chairman), Symington, Cannon, Smith

of Maine, Murphy, and Goldwater.

Of the staff of the Committee on Armed Services: T. Edward Braswell, Jr., chief of staff; and Labre R. Garcia, professional staff member.

Of the staff of the Preparedness Investigating Subcommittee: Ben J. Gilleas, director of investigations; Ed Kenney, Don L. Lynch, Hyman Fine, David A. Littleton, and George Foster, professional staff members.

DEPARTMENT OF THE AIR FORCE

BUDGET REQUEST

Chairman STENNIS. The committee will come to order. Secretary Seamans and General Ryan, we want to give you a special welcome to-day. I read your statement last night, Secretary Seamans, and thoroughly enjoyed it. I want to commend you for the style you use in putting this together. It is not only forceful, it is clear and to the point.

The committee today will receive the initial testimony from the Air Force on the authorization legislation for fiscal year 1971. Our witnesses will be the Secretary of the Air Force, Mr. Robert C. Seamans, Jr., and the Chief of Staff of the Air Force, Gen. John D. Ryan.

For the record the Chair would note that out of a total budget request in new obligational authority of \$71.2 billion, the Air Force request is \$22.7 billion. With regard to the authorization legislation before this committee, the Air Force procurement request totals \$4.8 billion out of the total procurement request for all services of \$12.5 billion.

Tomorrow, assuming we finish with these gentlemen today, we will hear from Gen. James Ferguson, Commander of the Air Force Systems Command, and Lt. Gen. Otto J. Glasser, Deputy Chief of Staff, Research and Development, who will testify on certain matters pertaining to procurement. Thursday the committee will consider the R. & D. portion of the Air Force request with General Glasser and the Assistant Secretary of the Air Force for Research and Development, Mr. Grant L. Hansen.

Mr. Secretary, as I have already said, you have an exceptionally good statement here. We will let you do what you wish, but it might be well to put it all in the record. Then it will be here for the benefit of all of us and the staff later, and then you can emphasize with such particularity as you desire the matters you consider of the highest

importance, and be subject to questions on all of it.

This is part of the record and it will go out for distribution finally all over the country. You may not get credit for the good things you say, but you get blamed for the bad things you say. I think you have a fine statement here and I am sure the general's is also. We are glad to hear from you gentlemen. Proceed in your own way now, Mr. Secretary.

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STATEMENT OF HON. ROBERT C. SEAMANS, JR., SECRETARY OF THE AIR FORCE, AND GEN. JOHN D. RYAN, CHIEF OF STAFF, U.S. AIR FORCE

Secretary SEAMANS. Thank you, Mr. Chairman, members of the committee.

It is a pleasure to meet with you again. My purpose today is to explain and justify the Air Force fiscal 1971 authorization request. Our authorization and appropriations requests for fiscal year 1971 represent a considerable decline below the program for the previous 2 years.

To place this in perspective, it is interesting to compare it with the program in the last 2 years. You can see this in the following table which shows that from 1969 to 1970 there was a reduction in total authorization of about \$1.85 billion, and a still further reduction going

from 1970 to 1971 of about \$1.4 billion.

[In millions of dollars]

	Actual,	Estimated,	Request
	fiscal year	fiscal year	fiscal year
	1969	1970	1971
Authorization. Appropriation (TOA)	10, 418. 6	8, 608. 6	7, 846. 6
	26, 216. 2	24, 274. 0	22, 782. 9

The impact of these successive cuts is reflected in Air Force personnel strengths. Another table follows which shows a reduction of about 72,00 from 1969 1970, another 37,000 from fiscal year 1970 to 1971. The recent base reductions that we have announced obviously take into account these reductions shown in this table.

	Fiscal year—			
_	1969	1970	1971	
Military Civilian	862, 062 349, 262	809, 627 330, 112	783, 520 319, 089	
Total	1, 221, 324	1, 139, 739	1, 102, 609	

As is readily apparent, the fiscal 1971 budget represents continued rapid retrenchment for the Air Force. Measured in actual purchasing power and in personnel, Air Force resouces will be at the lowest level since the Korean buildup.

The fiscal 1971 budget was developed against the background of the sharp reductions made in fiscal year 1970, and our guidance recognized other pressing national needs. Our initial submissions were restricted by fiscal limitations, and under pressures of the need to achieve national fiscal balance, our low initial request was cut further—really, to rock bottom.

At this reduced level we have had to make many hard choices between current force levels and urgently needed modernization both near and long term. We have, of course, made a determined effort to trim away any fat by reducing overhead. In all headquarters above

wing level, for example, our personnel cuts will reach 15 percent during fiscal year 1970 except for the intelligence function which will be cut 10 percent, and by headquarters I am, of course, including the Air Staff and the Secretary's Office.

The decrease in the fiscal year 1971 request is apparent in most of

the following appropriations:

TOTAL OBLIGATIONAL AUTHORITY
[In millions of dollars]

	Fiscal year—			
_	1969	1970	1971	
Aircraft procurement	\$4, 783, 1	\$3, 954, 4	\$3, 514, 3	
Missile procurement	1, 639. 8	1, 561, 0	1, 580, 1	
Other procurement	2, 609. 3	1, 971, 0	1, 604, 8	
Operation and maintenance	6, 841, 1	6, 533, 3	6, 176, 5	
RD.T. & E	3, 442, 5	3, 080, 5	2, 909, 7	
Military personnel	6, 087, 2	6, 325, 5	6, 096, 0	
Military construction	281. 3	290. 3	297. 2	
Reserve and Guard Forces	441.8	557. 9	550, 3	
Total (TOA)	26, 126. 2	24, 274. 0	22, 728. 9	

This table shows a breakout of the total obligational authority for the 3 years 1969, 1970, and 1971, and it is interesting to note, for example, that we have the reduction of \$440 million in aircraft procurement, in other procurement \$367 million, operations and maintenance \$357 million, R.D.T. & E. \$171 million going from 1970 to 1971, and military personnel reflecting our reduction in manpower \$229 million.

In aircraft procurement our authorization request for this year calls for a buy of only 390 aircraft compared with 948 in fiscal year 1969—and compared with total operational and combat losses of 470 aircraft in calendar year 1969. This buy is the smallest number of aircraft we have procured in any 1 year in the history of the Air Force—actually since the days of the Army Air Corps in 1935. I might also add, parenthetically, that over half of this buy is for aircraft which will be transferred to Southeast Asian forces.

The following table breaks out most of our major aircraft programs as well as several support categories.

A IRCRAFT PROCUREMENT
[Numbers of aircraft in parentheses, dollars millions TOA]

	Fiscal year—					
-		1969		1970		1971
C-SA F-111 A/D/E/F FB-111	(27) (85) (42)	498. 7 642. 8 437. 7	(23) (66)	706. 0 698. 3		544. 4 483. 5
A-7D	(57) (145)	190. 0 385. 7	(128)	372. 3 25. 7	********	242. 7 77. 3
F-RFSA/B RF-4C Mecalinacous support aircraft.	(9) (36) (264) (283)	7. 3 88. 7 145. 2	(10) (146)	9. 4 5. 9 99 . 4		10. 3 42. 7 80. 5
Melicapters	(283)	142. 9 650. 8	(213)	80. 6 28. 0 498. 6		46. 6 30. 0 537. 4
Spere and repair parts. Support equipment and facility		921.6 122.6 549.1		797. 0 108. 7 524. 5		599. 0 121. 4 698. 5
Total (TOA)	(948)	4, 783. 1	(5£6)	3, 954. 4	(390)	3, 514. 3

In this table you will notice there is a buy of 180 helicopters. These are for Southeast Asia.

I will discuss the first two of these aircraft procurement programs, the C-5 and the F-111/FB-111. General Ryan will deal with others, and, of course, our witnesses will cover the entire request in detail in subsequent hearings.

Secretary Packard was with you this morning and, I believe, discussed in detail the need for the C-5, the contractual and financial problems that we have experienced in carrying this procurement out with the Lockheed Co.

THE C-5A STRATEGIC TRANSPORT

It is important to remember that the C-5 possesses a combination of features not possessed by any other aircraft: the ability to operate into semiprepared airstrips as short as 4,000 feet; capacity to handle outsize cargo; roll-on and roll-off loading and unloading for rapid cargo handling; self-contained avionics and navigational systems; and heavily stressed cargo floors which permit the unrestricted positioning of heavy vehicles inside the airplane.

These capabilities—plus the speed, range, and large total tonnage our new force can carry—will open new and attractive possibilities. We will not have to depend as much on overseas basing. If an emergency arises, we will be able to support our allies rapidly. I am confident that in future years our modern strategic airlift fleet of C-5s and

C-141's will prove to be a national asset of major significance.

Last year we went into great detail on C-5 funding. It appeared to us then that the 120-aircraft program would cost about \$4,831 million, including initial spares. As we interpreted the contract, the contractor would lose some \$285 million on 120 aircraft, and in any smaller buy the contractor's loss would be higher. The contractor disagreed. By his interpretation of controversial contract provisions he expected to make a small profit on the total program.

As a consequence of budget constraints, rising costs, and an overall reappraisal of defense requirements, we have now limited the program to 81 aircraft. The program's final cost to the Government, however, depends on resolution of the issues between the Air Force and contractor over the contract. We are still trying to work these out with Lockheed, but as we have pointed out elsewhere, litigation may be required. If the Air Force wins all the arguments, the 81-aircraft program will cost about \$4 billion, including initial spares. If the contractor wins all his points, the cost will be considerably higher, on the order of \$500 million more. I wish I could report a clearer situation, but I cannot. To be completely realistic, it may be several years before we know the exact outcome of this program.

In spite of funding difficulties, we strongly support the 81 aircraft as the minimum essential program. With respect to performance, on balance the airplane is coming along satisfactorily. We have had technical problems with the aircraft, the most significant being the wing cracks. A fix is being retrofitted into aircraft already produced. With Lockheed's inability to meet delivery schedules early this year, the production fix can now be incorporated in the first MAC opera-

tional aircraft rather than the 32d production aircraft.

In addition, we are establishing a panel of NASA, industry, and scientific community experts, under the Scientific Advisory Board, to review the entire C-5 technical picture, with emphasis on structural integrity. We have chosen as Chairman of this committee, Dr. Bisplinghoff, the Dean of Engineering at MIT, a person with whom I have worked extensively over the years, who was in NASA for a period of several years and who has a very strong background in construction.

I would like to emphasize we feel very strongly that we should continue with the production of the aircraft up to the number of 81. However, I would also like to emphasize that we can only do this if there are modifications to the contract that permit the Air Force to truly control and manage the Lockheed effort. We must have direct responsibility for the scheduling, for engineering changes including the structural change to the wing, for the procurement of spare parts and such matters, and these items are now, because of the procurement instrument that we are working with, very difficult to deal with.

With regard to the F-111, let me put in the record the section on this aircraft and just state that this is a unique aircraft that will do what

no other aircraft can do for us.

F-111/FB-111

The F-111 represents a major step in modernizing our interdiction and long-range penetration capabilities. Its terrain-following radar permits penetration under enemy radar, and its extremely accurate radar delivery capability makes it highly effective once its reaches the target. No other aircraft can compete with the F-111 in night or all-weather attacks. There have been problems with the F-111, but we should remember that it marks a major advance in technology and programs of this sort are always fraught with difficulty.

As you know, after the loss of an F-111A on December 22, 1969, we immediately grounded the entire F-111 fleet. Through the Air Force Scientific Advisory Board we have brought in experts who are reviewing the whole question of fracture mechanics and how it applies to the F-111 problem. This is a different group than was brought in for the C-5A. Their report will address ways to check for cracks as well as how to avoid this problem in the future. As the results are compiled, this information will be made available to the committee.

Investigation has established the cause of the December accident as structural failure resulting from a material flaw in the wing pivot fitting. We have identified the manufacturing process that probably caused the crack, and have also established how such a flaw could have escaped detection. While we believe this to be an isolated occurrence, we are proceeding on the assumption that such defects may exist on similar structures throughout the fleet. We are presently developing corrective actions which include a complete inspection of the wing pivot fitting and a static proof test to limit-load the complete aircraft. Concurrently we are reviewing in detail the entire manufacturing process of each piece of critical structure to determine if further inspection is required.

It is important to differentiate this problem, which involves a material defect in the wing pivot fitting, from the structural fatigue problem of the wing carry-through box that has been discussed in the past months. As a result of our fatigue testing of the wing carry-

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through box, we have incorporated several improvements in this structure to extend the fatigue life. We are also designing a new box which we anticipate will provide for more than 4,000 hours of fatigue endurance. This new box will be incorporated initially in the F-111F aircraft and installed in the earlier aircraft during scheduled inspection and repair cycles starting in mid-1972.

While for force planning we show a procurement quantity of 40 aircraft in fiscal year 1971, thus rounding out the buy of the F-111, it is now clear that we cannot promise this number with the budgeted funds. We do not yet know the exact cost of the wing fix and will advise

you as soon as possible of the adjusted procurement quantity.

We believe the aircraft remains a necessary addition to our force. The FB-111 will help us maintain the bomber portion of our strategic deterrent. It is a necessary part of our planning because the older model B-52's are gradually phasing out, Soviet air defenses are rapidly improving, and a new bomber, the B-1, cannot be operational before the late 1970's.

It is our plan to completely revalidate all of the aircraft that have been fabricated, and those that have been delivered to the Air Force as well as those that have not yet been delivered. We had a failure, as the statement indicates, in the left wing of an aircraft during a rocket firing pass. This was a catastrophic failure. It resulted from a small crack in a forging which supported the left wing.

This is the kind of failure that can lead to complete fracture of the casting and is not a fatigue problem as such. In order to insure that this does not happen again with any of the aircraft that we have in service or in fabrication, we are going to run all the aircraft through

a complete structural test.

We have funds in the budget for additional aircraft. Were it not for the cost of these tests, these funds would permit us to buy 40 additional aircraft which would round us out to four wings of the 111s.

We still have under review the costs of these tests. We know that as a result of the tests we will not be able to complete the 40 but we

believe we can buy some number like 35 aircraft.

The situation has been such that we have, of course, studied the possibility that we might not choose to buy the additional aircraft, either the 35 to 40 out of 1971, or the ones that we funded from fiscal year 1970. In these kinds of situations if this should eventuate, we would then buy either additional F-4 or A-7 aircraft. However, we are confident that the aircraft will pass these tests, and that we will pass on with the aircraft and put them all into service.

Going on to missile procurement——

UNIT COST OF 1935 AIRPLANES

Senator Symington. Mr. Chairman, may I ask two short questions on this testimony?

Chairman Stennis. Senator Symington has a couple of questions,

gentlemen, on the planes.

Senator Symington. Thank you. It would be interesting if you, Mr. Secretary, gave the unit cost of the airplanes bought in 1935.

Secretary Seamans. I have to file that for the record, but you know it is a very low figure.

(The information follows:)

Our historical records indicate that 52 aircraft were accepted from contractors in 1935 at a total cost of \$2,811,661. Fifty of these aircraft were PB-2A, also known as the P-30A. This was a two place, single engine fighter which cost \$55,035 each. There was also one XO-46, a single engine observation aircraft which cost \$26,911 and one YA-13 (also called the A-16 and A-17), a 2-man, single engine attack airplane costing \$33,000. The average price for the 52 aircraft was \$54,069.

C-5A

Senator Symington. My second question is based on your own figures. If everything goes well, these 81 aircraft, the C-5As, will cost about \$55 million apiece; correct?

Secretary SEAMANS. About \$53 million is correct, on a total program cost basis, depending, of course, on the outcome of the contract negotiations.

Senator Symington. Thank you, Senator. All right, will you proceed with the missiles.

Secretary SEAMANS. Missile procurement.

The principal item in missile procurement is the MINUTEMAN III. After a number of delays and stretch outs we will start fielding the MINUTEMAN III in June; and based on tests to date we have high confidence in this system.

There follows a table that breaks out the cost of the various missiles. It also shows the amounts for modification, spares, and other support equipment.

MISSILE PROCUREMENT

[Numbers of missiles in parentheses, dollars in millions TOA]

	Fiscal year 1969	Fiscal year 1970	Fiscal year 1971
MINUTEMAN	(68) 447.6	(100) 457. 4 10. 0	475. 7 99. 5
SHRIKEMAVERICK	(1, 200) 25.6	(300) 7.1	9. 7 25. 0
STANDARD ARMSPARROW	(135) 30. 5 (2, 553) 53. 6	(1, 200) 34. 1	14.4
Modification. Speres and repair perts. Other support equipment and facility.	186. 8 96. 0 799. 6	169. 6 69. 4 813. 4	206. 0 64. 6 685. 2
Total (TOA)	(3, 956) 1, 639. 7	(1,600) 1,561.0	(942) 1,580.1

If we are going to maintain our strategic deterrent capability, we must be certain that our missiles remain able to survive an attack and penetrate the enemy's defense. The Soviets have a rapidly growing strategic capability with more ICBMs and over twice as much landand sea-based missile payload as the United States. They also have a deployed ABM defense of the Moscow area and a major development program for improved ABM capabilities. The SAFEGUARD system will help us protect our missiles from a Soviet missile attack. MINUTEMAN III improvements will insure that our surviving missiles could penetrate the Soviet ABM system. Under those conditions, the ICBM portion of our deterrent should remain effective for a considerable time—doing its part to make strategic war unlikely. In research and development we are providing for a re-examination of ways to improve MINUTEMAN survivability. If the Soviets continue to increase the threat, it may prove more cost effective to rely

upon a broader mix of defensive measures—close-in hard point defense, hardening, and multibasing, as examples.

We have, parenthetically, \$77 million in the budget for these studies

and tests.

With respect to SRAM, we allowed the procurement option to lapse on April 1, 1969, because of development difficulties. The program is now in a crucial testing phase, and I am glad to report that we had two completely successful launches on the 18th and 25th of February. These were launched from B-52s.

Based upon a favorable outcome of these tests, we now hope to commit \$10 million in June 1970 for long lead time procurement items. The fiscal year 1971 request of \$99.5 million represents the first quantity procurement. But I stress that this will be done only if we are firmly convinced that the development problems have been solved.

The Congress will be advised in advance of this decision.

MAVERICK, an air-to-ground attack missile, is also in a test phase. This program is just about on schedule, and at this point the costs are in line with our estimates. By June or July we expect to have sufficient information to make a procurement decision. Again, we have had successful tests of the MAVERICK.

RESEARCH AND DEVELOPMENT

The next chart shows the total R.D.T. & E. request and a few principal items for fiscal year 1971 compared to the current programs for the 2 previous years:

RESEARCH AND DEVELOPMENT [In millions of dollars, TOA]

	Fiscal year			
_	1969	1970	197	
Aircrait	598, 7 (25, 0) (68, 5)	708. 2 (100. 2) (175. 1)	831. 3 (100. 0) (370. 0)	
A-X. Missiles Astronautics.	982, 5 1, 042, 3	(2, 0) 907, 3 642, 4	(27. 9) 762. 8 437. 7	
Ordnance Other equipment	44. 9 321. 0 (39. 3)	69. 1 302. 8 (40. 0)	78. 3 359. 6 (87. 0)	
Military sciences	147. 4 305. 7	136. 4 314. 3	134, 6 305, 4	
Total (TOA)	3, 442. 5	3, 080. 5	2, 909. 7	

It is interesting in this chart to add up all of the R.D.T. & E. that we are doing on aircraft as compared to missiles and spacecraft. This year, 1971, we have more funding going into aircraft by a fairly substantial amount than going into missiles. I might point out in making the summary I included in the aircraft procurement those missiles like SRAM that are directly for aircraft use.

You will notice in this comparison that we reduced our R. & D. budget nearly \$360 million from 1969 to 1970, with a further cut of approximately \$170 million from 1970 to 1971, this at a time when we are putting great emphasis on attempting to modernize our capability. Intelligence informs us that the Soviet R. & D. effort, however,

is increasing. Despite their much smaller GNP, about half of ours, the Soviet program outstripped ours sometime between 1966 and 1969, we believe. I know of no area in which Soviet weapons reflect a significant technical advantage today, but their current weapons are products of technology of the early 1960's. The move from R. & D. status to operational systems involves long lead times, and we have yet to see the results of the massive Soviet research and development programs of the past 4 years. If the Soviet Union is successful in adding technological superiority to its present and growing numerical advantage, our national security could be severely jeopardized.

This is why I am particularly concerned at the cuts in the Air Force

This is why I am particularly concerned at the cuts in the Air Force R.D.T. & E. budget. We are making every effort to get more for our money. This includes measures to guarantee that all R. & D. is related to real defense needs—a policy which Congress emphasized by inserting Section 203, Public Law 91-121. Nevertheless, there are real limits to the possible improvements we can make in efficiency.

In the astronautics area a new satellite strategic surveillance system is of first importance. [Deleted], it will further insure our ability to deter nuclear attack. It will significantly increase warning time compared to current systems. With adequate warning of an attack by either land- or sea-based missiles from anywhere in the world, our bombers and missiles are more certain to survive and retaliate. This system will also provide [deleted]. It is my feeling that this project has as high a priority as any project that we have in the Air Force.

At the beginning of my statement I pointed out the hard choices we had to make between modernization and current force levels. The amounts provided for aircraft development clearly indicate the urgency and importance which we place on our long-term modernization. We have four major aircraft modernizaton programs.

THE B-1

Secretary Seamans. Our strategic bomber force has been cut drastically in recent years. As a result of budgetary pressures, we have phased out the entire B-58 force sooner than previously planned. Our buy of the FB-111 has been reduced from 264 to 77. Retirement of the B-52 C through F models continues. The prototype B-52 dates back to 1952. The latest models were built in 1962. As our aircraft age, modification and upkeep necessary to permit them to penetrate improved Soviet defenses become increasingly expensive.

We must not fall into the trap of neglecting our bomber force on the grounds that we have missiles and then discounting the threats to our missile force because we have bombers. If we do not modernize our forces, both our missiles and bombers could be neutralized by an enemy intent on developing a successful first strike. If we modernize only missiles or only bombers, the Soviets could concentrate their resources on that single force. There would be considerable risk of an enemy technological breakthrough or miscalculation that could bring on an attack.

As long as we maintain both bomber and missile forces and keep them both up to date, our chances of avoiding strategic war will re-

main very good.

Design of the B-1 will take advantage of the many technical advances made during the past decade. Compared to the B-52, the B-1 will have a higher penetration speed, reduced radar cross section, larger payload capacity, a better capability to penetrate at lower altitudes, quicker reaction launch, and the characteristics necessary to operate from austere dispersal bases. Moreover, better electronic countermeasures, target finding systems, and weapon delivery systems will further improve the ability of the B-1 to deal with enemy targets in all types of wars, both nuclear and nonnuclear.

We will not go ahead with production until after the prototype flies. We received the last proposals from contractors on February 16, and our current plan is to award engineering development contracts in late spring. The first flight is expected about June of 1974, if no unan-

ticipated delays arise.

THE F-15 AIR SUPERIORITY FIGHTER

We expect the dramatically advanced performance of the F-15 to make it the finest air-to-air fighter in the world during the late 70's and 80's, more than a match for the fighters which will undoubt-

edly result from the vigorous Soviet R. & D. program.

The F-15 program is making progress. In December 1969 we selected McDonnell Douglas as the system contractor. The contract incorporates our new "milestone" approach under which the program is thoroughly reviewed at important phase points before major new amounts of money are committed. We hope that this technique will help us reduce the cost growth which has plagued us in the past. Our next contract award will be made in March for the engine. Contractor proposals are presently being evaluated.

We are calling on new management ideas to streamline the program. The System Program Director reports directly to General Ferguson, Commander, Air Force Systems Command, who in turn reports directly to General Ryan and me. The Program Director has been delegated full management authority while my staff confines itself to monitoring and helping out in case any serious problems arise. In the latter

event, these streamlined channels allow immediate action.

THE A-X CLOSE SUPPORT AIRCRAFT

Our experience in Southeast Asia has demonstrated anew the value and difficulty of air action against hostile tragets close to friendly troops. By the mid-1970's we hove to bring our close support capability fully up to date with a new aircraft, the A-X. The A-1 has served us well in Southeast Asia. However, it is an old airplane, and we consider the A-X as a replacement for the A-1. It will be our first aircraft especially designed for this mission. It will have short take-off and landing characteristics; excellent maneuverability; large, varied payloads; and long loiter times. In addition, it will be the first of our airplanes planned from the start with high survivability against ground fire as a primary objective.

The A-X will have conventional structure, modest requirement for engine development, and largely off-the-shelf avionics that should insure a relatively low cost, low risk program. It will counter the trend of recent years toward more expensive and sophisticated aircraft. Our objective is a truly simple, inexpensive airplane, optimized for close air support of the Army. We plan to utilize the competitive prototype flyoff method for selecting the A-X contractor.

AWACS

If our air defenses are allowed to deteriorate, the Soviets can use their bomber force not only as a deterrent, but to further increase their first-strike potential. We have drawn down our air defenses very heavily in the last few years—from 1,525 regular and ANG aircraft in 1962 to 577 at the end of calendar year 1969 without compensating qualitative improvements.

For an effective air defense, we must be able to detect and destroy a major portion of the approaching bombers. But our present detection radars are ground-based and vulnerable to enemy missile attack. They might be eliminated before the bombers arrived, and our interceptors would be left blind. Also, our present ground-based

system has a very poor low altitude capability.

Both the vulnerability and lack of adequate low altitude detection can be solved by over-the-horizon (OTH) radar and an airborne warning and control system (AWACS). CONUS OTH radar will provide long-range bomber detection which will allow AWACS to reach combat positions from ground alert. AWACS will provide precise intercept direction which will not be interrupted, as OTH would be, by nuclear explosions. While airborne, AWACS will not be vulnerable to ballistic missile attack. In addition, its radar will be above the surface looking down, able to spot intruders at any altitude. AWACS is our first priority need for air defense.

Chairman Stennis. Excuse me, Mr. Secretary. We must go now for

a vote. There will doubtless be a good many questions.

(Short recess.)

Senator Symington. Mr. Secretary, will you proceed. The Chair asked we start the meeting. I think you were reading.

Secretary Seamans. Yes, Mr. Chairman.

IMPROVED MANAGEMENT PROCEDURES

Many of our current procurement difficulties stem from procurement practices which it is now apparent were not sufficiently tested before their adoption. The C-5 contract is a principal example. It is going to take a long time to work out some of these problems. But we feel we have identified the major stumbling blocks. The type of contract was not always tailored to the nature of the system being procured. For example, we can see now that total package procurement was not appropriate for an aircraft as complex as the C-5. Also, there has been too much emphasis on concurrency of development and production. Finally, in my judgment, there has been too much centralization of control in the acquisition process with the result that initiative and flexibility were often limited. Stated another way, we have not put enough emphasis on building up the capability of the project people in the field who have the direct responsibility.

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We are attempting to correct these deficiencies in several ways. We are trying to design each major contract to suit the situation at hand. As another example, in new contracts such as I mentioned on the F-15, we have incorporated significant milestones or performance goals. By measuring contractor performance against these contractually binding milestones, we hope to avoid costly mistakes of moving too far too fast. We are also insisting on hardware competition whenever practical so that technical risks can be solved before production is begun. For example, both General Electric and Pratt-Whitney built prototype engines for the F-15. We then used actual test data as a basis for the award of the production contract. As you know, the award went to Pratt-Whitney. I noted earlier that we plan a prototype flyoff in the case of the A-X.

With respect to organization, we are giving greater authority and responsibility to our Systems Program Directors. We feel that this decentralization will speed up decisionmaking, free higher levels from routine tasks, and encourage initiative, innovation, and flexibility.

At the same time we will make sure that the necessary information is available for effective high-level review. No doubt each of you is familiar with the quarterly Selected Acquisition Reports initiated as of June 30 last year. To date the first three have been submitted to Congress. There are still problems of establishing agreed and appropriate baselines and providing adequate explanations of costs, particularly changes in costs. But it is clear that the Selected Acquisition Report provides another important management tool.

Within the Air Force we have instituted monthly reviews of significant weapon systems acquisition programs whose cost, schedule, and performance aspects are examined for potential problem areas. General Ryan and I supervise these reviews. I believe that such continuing, regular, and close scrutiny of these programs will surface

problems at the earliest possible date.

RESERVE AND NATIONAL GUARD

With the reduction in active force strength, the importance of maintaining our Air Reserve and National Guard forces at a high level of readiness increases. These forces have directly contributed to our combat effort in Vietnam and have augmented our forces at home. For fiscal year 1971 our Selected Reserve components will be programed to attain an average strength of not less than 87,878 for the Air National Guard and 47,921 for the Air Force Reserve.

VIETNAMIZATION

Vietnamization is our most important program in Southeast Asia. The Vietnamese Air Force is now carrying out about 30 percent of the fixed-wing attack missions over South Vietnam, excluding B-52 sorties. Its goal is to double in size within the next 2 years. I returned in late January from my second visit to South Vietnam, and generally I am pleased with the progress. As you will readily appreciate, in such a highly technical task as building an air force, the major difficulty is one of training. In this case the language barrier compounds the problem. However, I believe that we are now improving our language training, and we hope thereby to strengthen our training programs for

Vietnamese pilots and technicians. General Ryan and I have established a focal point for all Vietnamization actions in the Air Staff, and I assure you that this subject gets our close and continuing attention.

CONCLUSION

Mr. Chairman, I would like to leave the Committee with these thoughts. The Soviet and Chinese threats to our security are growing, not diminishing, while our present equipment is aging and our overall budget is being reduced. In constructing this budget we have been very much aware of vital domestic needs for funds. With these thoughts in mind we have cut our requests and then cut them again. We have faced up to many extremely difficult decisions between maintaining larger forces to meet the current threat or paring force levels in order to face the future with better equipment.

All in all, I believe that the request we have laid before you is the lowest which can do the job. It represents a balanced effort to cope with the present and future challenges of our national security.

That concludes my statement, Mr. Chairman.

Chairman Stennis. All right.

As I said at the beginning, I thought you had a mighty good statement.

PREPARED STATEMENT OF GENERAL RYAN

We are glad to have you here, and give you a special welcome, General Ryan. This is not your first visit with us by any means, but the first time you have come to present the budget. We had the Secretary with us last year and again this year, and we welcome you here in this added capacity. We think you have made a mighty good start in your tenure as Chief of Staff.

General Ryan. Thank you, Mr. Chairman.

Chairman Stennis. We are delighted to have you.

General Ryan. I consider it a special privilege and honor to appear before this Committee as the Air Force Chief of Staff and to present

our fiscal year 1971 requests.

As Secretary Seamans has already mentioned, this year's budget reflects a continuation of the very sharp reductions made in the fiscal year 1970 budget. In terms of available financing in constant dollars, this year's Air Force budget request is the smallest since pre-Korea. It supports the smallest Air Force since that time. Measured in terms of the Air Force of 2 years ago, at end fiscal year 1971 we will have 78,542 fewer military personnel, 30,173 fewer civilian personnel, 950 less aircraft, and over a 14-percent reduction in our R. & D. program. As Secretary Seamans has pointed out, in making this retrenchment we have attempted to provide the maximum resources possible for the modernization of our forces in both the near and long term. At the same time, we are trying to maintain maximum combat-ready strength for use wherever and whenever required.

The inherent risk in our reduced posture is difficult to measure. I know of no means to quantify this precisely. However, if a potential enemy has equal or better equipment than we have—and more of it—then commonsense tells me that in the event of hostilities we are in trouble. In this vein and complementary to what Secretary Seamans

has said, I will review the overall threat in each force area and provide a specific assessment of what we are doing and of what this budget provides.

THREAT

Although the Soviets appear willing to negotiate on strategic arms limitations, there is no evidence of constraint in their development and deployment of stratege weapons, and they have increased the war readiness posture of all their military forces. While the Soviet GNP is only half that of the United States, the dollar value of their military research and development and space effort exceeds ours. Already challenging the United States in quantities of strategic forces, the Soviets may be able to challenge the qualitative superiority that we have long enjoyed in weapon systems. Thus the Soviets could, in time, seriously erode the level of our assured destruction unless we take countermeasures.

In the past, Soviet leaders recognized that their inferior strategic posture could not sustain a policy of high risks and confrontation. With the growth in their strategic power, the Soviets have exercised greater freedom of political and military action throughout the world. In the 1970's, the Soviets can be expected to be more assertive. They will feel greater confidence in exploiting situations in which they believe they hold an advantage, even if it calls for the use of military force.

We are also confronted with a Chinese Communist nuclear threat of growing importance. The Chinese have an estimated capability to produce fission weapons or thermonuclear weapons, or a combination of both. Analyses of nuclear tests indicate China can produce both weapons for delivery by bomber and fission weapons for delivery by MRBMs. The Chinese may be developing ICBMs also. The earliest possible initial operational capability for an ICBM system would probably be late 1972 or early 1973.

An important aspect of the total threat is Soviet and Chinese support—whenever it seems to their advantage—of subversion and instability in less developed nations. It is reasonable to expect more of this in the future.

In brief, our security is increasingly challenged by the rapidly improving military capabilities and aggressiveness of the Communist powers. The pace of Soviet strategic weapon deployments and its massive research and development program indicate clearly that they are seeking military superiority, particularly strategic nuclear superiority. If the Soviets achieve such superiority and we fail to maintain adequate forces, our ability to deter aggression would be seriously jeopardized.

STRATEGIC OFFENSE

The Soviet's operational ICBM force already outnumbers ours, and by mid-1971, will probably exceed ours by several hundred launchers. While, so far as we know, they have not yet tested a hard target MIPV, they have the technology to develop such a MIRV, and we believe they will do so. A fractional orbit bombardment (FOBS) or depressed trajectory ICBM (DICBM) may already be operational. Their new "swing-wing" bomber prototype could become operational, and their submarine-launched ballistic missile force is expanding rapidly. All

of these developments represent serious challenges to our security in the immediate future.

In the strategic force area our emphasis remains on the ICBM capability. We will introduce MINUTEMAN III into the force beginning this year, starting a gradual replacement of the earlier MINUTEMAN. MINUTEMAN III possesses improved survivability, penetration capability, payload, and accuracy over the older MINUTEMAN systems. MINUTEMAN III will have the potential of attacking different targets within its reentry system "footprint." It will be able to carry the necessary penetration aids to reduce vulnerability to enemy defenses.

In the fiscal year 1970 and 1971 budgets we have slowed the previously planned rate at which MINUTEMAN I missiles would be replaced by MINUTEMAN IIIs. The 1971 buy of missiles is the minimum number required to support our deployment schedule and provide operational test missiles and spares. We are procuring these missiles on a short leadtime basis, and are on a tight schedule. This year's buy, added to those for fiscal years 1969 and 1970, will place us just

over the one-third mark in this crucially needed program.

Based on the recent estimates of actual and potential changes in the Soviet ICBM force we need a new basing concept, using mobile, fixed, hardened or defended sites—or perhaps a mix of these—to increase survivability of our land-based ICBM force. We are currently examining all of these various means of increasing MINUTEMAN survivability. For long-term missile improvements, we are budgeting \$6 million for advanced ICBM technology.

The Soviets continue to devote a major effort to air defense. An improved SAM, the "TALLINN," is being rapidly deployed; large numbers of Mach 2-2.5 long-range and point interceptors are already

operational.

We continue to reduce the bomber strength of the Strategic Air Command. We have phased out the B-58s, and severely cut back the FB-111s. At end fiscal year 1971, we will have fewer B-52s and 66 FB-111s. We hope to offset the reduced strength by increasing the capability of our bombers with the short range attack missile (SRAM) and the subsonic cruise armed decoy (SCAD) and providing for increased prelaunch survivability through satellite basing and improved warning.

The Secretary noted that this was the first year we were requesting quantity procurement for the SRAM. We, however, will not place the production contract until the SRAM proves itself in testing. This year's buy will initially equip a few B-52 squadrons. Eventually, we want to equip all B-52 G/H and FB-111 squadrons with the SRAM.

The SCAD will be a low or high altitude decoy missile which will aid in bomber penetration and survival through the dilution of enemy area defenses.

Satellite basing will add to our bomber force prelaunch survivability by increasing the number of bases an enemy must attack and by reducing the time required to launch the force. Increased warning will be provided through our satellite warning system which has been discussed by Secretary Seamans.

Secretary Seamans pointed out the necessity for the B-1. It is my firm conviction that the B-1 is an essential part of our future strategic

force. My principal concern is that, even with our current program, we might not get it early enough. We must recognize the need for an advanced bomber in today's budget to insure that a greatly improved aircraft will be ready when this decade draws to a close. The need for the B-1 is particularly acute due to the significant improvements and more widespread deployments expected in Soviet defenses.

STRATEGIC DEFENSE

Over the past few years the strength of our defense force has been reduced, based in part on budgetary considerations, obsolescence, and its expected near-term replacement by a modernized air defense system. In the last 5 years we have cut our active interceptor strength by two-thirds and our radars by one-half. The Soviets during this period have maintained their long-range aviation forces at about 200 heavy bombers and over 700 medium bombers and tankers, despite repeated estimates that they would be rapidly reduced. If our quantitative reductions are not offset by a significant improvement in quality, we expect the Soviets to re-evaluate their bomber options. The evidence of their development of a new bomber supports this view.

We have 252 interceptors in the regular force and 313 in the Guard supported by some 112 search radars. This general erosion of our defensive posture has occurred despite our urgent proposals over the

years for modernization of the entire air defense system.

Specifically, our recommendations for air defense modernization include an Airborne Warning and Control System (AWACS), Over-the-

Horizon (OTH) radar, and an improved manned interceptor.

The AWACS is the priority item. It will provide a survivable capability to detect, identify, and track high and low flying enemy bombers over both land and water before they reach their air-to-surface missile launch points. It will replace those elements of our ground-based radar and control system being phased down. It will increase the effectiveness of an improved interceptor, as well as present interceptors, and will also have an important role in tactical applications.

We are requesting \$5.3 million and approval to commence contract definition in fiscal year 1971 for the CONUS OTH radar program. We presently estimate that this system will become fully operational by the late 1970's. Sites are planned to provide long-range surveillance, detection, tracking, and identification of aircraft approaching North

America.

We have not been able to provide funds in this budget to make much progress toward an improved manned interceptor. We have only a small amount for advanced fire control and missile technology and also a small amount directed toward airframe selection.

In summary, our Air Defense posture continues its phase down even though the threat may be growing. Our priority effort is the AWACS. For the longer term we badly need to get a more meaningful program underway, particularly for an improved interceptor.

TACTICAL FORCES

At the end of last year, 25 percent of our tactical fighter force was over 13 years old. Deliveries of new aircraft have barely maintained the active inventory. Our fighter aircraft procurement for fiscal year 1971 is the smallest since World War II except for fiscal year 1960.

It does, however, give us some degree of modernization with the F-4E,

the A-7D, and the F-111.

Secretary Seamans has discussed the F-111. The F-4, of course, is the backbone of our force. The A-7 looks good. Its bombing accuracy is particularly impressive and it will be a valuable addition to the force.

In addition to this fighter modernization, we are also procuring some RF-4s to account for attrition and some C-9 aircraft to complete the aeromedical evacuation force. The first four of 16 T-X navigation trainers are also in this year's buy. The T-X program truly represents long-term savings. These 16 aircraft will eventually replace the 79 T-29 trainers we are now using. In the first 8 years of operation, these aircraft and the associated simulators will save enough to pay for the program.

Out of a total buy of aircraft, less than half are for the Air Force; most are F/RF-5s, helicopters, and trainer aircraft for our allies in

Southeast Asia.

Our planned tactical fighter force structure remains at 23 wings. Currently, this force provides the aircraft dedicated to NATO, the Pacific, and for a rotational and reinforcing base in the CONUS. We have examined the possibility of reducing this force but with the overseas commitments and the need for a rotational and reinforcing base in the United States, we feel that 23 wings are the practical minimum.

F-15 AND A-X

The U.S.S.R. has developed at least nine new fighter aircraft during the 1960's. While not all of these have been produced for operational units, it is clear that the Soviets are seriously challenging us for tactical air superiority. We badly need the F-15 as an air-to-air fighter aircraft to counter Soviet fighters, whether the MIG 21s (Fishbed), SU-7s (Fitter), or the newer Flagons and Foxbats.

The F-15 has been designed for the various counter-air missions of sweep, escort, combat air patrol, and point intercept. It will provide the United States with a superior aircraft to maintain its worldwide supremacy in the tactical air arena. We believe we have designed a good airplane and we have selected a good contractor to build it.

Secretary Seamans has covered our request for the A-X. We have not been able to make the progress we had hoped with this aircraft. We now feel, however, that we are in a position to get on with development and we have \$27.9 million in the budget for that purpose. We believe that this specialized aircraft will help us provide better close air support for highly mobile ground forces in the seventies.

AIRLIFT FORCES

We have the best strategic airlift force in the world. Our forces programed for 1972 will more than triple the strategic airlift capability we had in 1965. We will do this with half the number of aircraft, and on a ton-mile basis it will be cheaper. The key to increased capability and decreased ton-mile cost is the $C-5\Lambda$. We expect to have our first squadron operational this summer and will move on to an all-jet force of four $C-5\Lambda$ squadrons and 14 C-141 squadrons in 1972.

Let me add a few words on the C-5. The wing crack problem discovered in January has had extensive publicity, and the airworthiness of the C-5 has been questioned. We have concluded this latest failure is similar in nature to the wing crack that occurred during static tests last July and the proposed wing fix should correct the problem. Analysis by Lockheed and Air Force engineers concluded the aircraft could be operated safely within previously prescribed limits. Based on this evaluation, they are flying today.

The tactical airlift force picture is not as good. Our experience in Vietnam has given us a realistic view of the total force required to operate in a combat zone. The total number of tactical airlift squadrons we had in the Western Pacific at the height of our combat operations there is the same as the size of the total world-wide active tactical

airlift force programed for the seventies.

We are not asking for the procurement of tactical airlift aircraft in this budget. We do, however, have a modest request for the LIT—the Light Intratheater Transport—and for VSTOL technology. For the time being, we consider it more important to concentrate on the developments needed to provide an improved airlift vehicle.

AIR RESERVE FORCES

Our Air Reserve Forces constitute the primary source of rapid force and manpower augmentation in the event of an increased worldwide need. To maintain and improve this capability, we are converting some Air National Guard (ANG) and Air Force Reserve (USAFR) units to new missions and better equipment. By so doing, our Reserve Forces will be better alined and trained to meet the active force needs of the future.

The Air Guard now has a total of 92 squadrons; 26 are tactical fighter units; 27 are assigned other tactical missions; 21 are airlift units, and 18 are air defense interceptor units, including a crew training squadron. The Guard tactical fighter force, which includes an F-100 training unit, will remain at 26 squadrons, with A-37s, F-105s, and F-100s replacing six squadrons of F-86s and F-84s during fiscal years 1970 and 1971. In their tactical reconnaissance force one RF-84 squadron will be converted to RF-101 aircraft.

We also plan on converting a number of units to C-130 tactical airlift aircraft and will continue modernizing other units of the tactical force as new procurement makes resources available from the active force. The ANG air defense interceptor units represent 55 percent of our total force dedicated to CONUS air defense. This past year, we

converted three F-102 squadrons to F-101 aircraft.

The Air Force Reserve now has 47 flying squadrons, of which 34 are assigned to airlift missions. The remaining 13 squadrons are assigned to tactical air support, rescue, and recovery, and special operations missions. We now have nine C-141 associate units and plan to further improve our strategic airlift capability by assigning associate units to all C-141 and C-5A squadrons. Associate units operate and maintain Military Airlift Command equipment and provide a surge capability to immediately increase utilization rates in the event of emergencies or wartime mobilization. In the tactical airlift area, we plan on a number of C-130 airlift units. We have four now and will equip additional squadrons as rapidly as the aircraft become available.

This planned modernization program is essential to maintain the Reserve Forces' capability to rapidly and effectively augment our active forces. We must supply them with the more advanced equipment as rapidly as new aircraft procurement for the active force will permit.

THE AIR FORCE IN SOUTHEAST ASIA

Our forces in Southeast Asia continue to do a superb job under difficult circumstances. Since 1965, 384,000 Air Force personnel have served in either Thailand or South Vietnam, basically on a 1-year tour. This has taxed our personnel managers to insure that qualified and properly trained people were available where they were needed. To do this we have had to draw down in other areas and have necessarily cut back our capability to respond immediately in the event of a contingency elsewhere.

Behind-the-line pilots have proven to be a valuable resource in manning the many systems we are using in Southeast Asia and, to some extent, our management has suffered in staff support areas as our experienced people took their turn at the front. On balance, how-

ever, our system has proved itself.

Any objective assessment of the use of air power in Southeast Asia highlights its critical importance. The B-52 has been extremely effective. By all reports, it's the weapon most feared by the enemy. Our close air support teamwork with all segments of our ground forces has been effective and decisive in many engagements. Army commanders have repeatedly praised our work. Our F-4s were able to hold their own against North Vietnamese MIGs even though we were fighting in the enemy's backyard.

The interdiction effort is our most significant current activity in Southeast Asia. We employ a variety of new techniques and weapons, including air-dropped sensors, a sophisticated real and near-real time readout system, area mines, electro-optical and lasser guided bombs, and various versions of gunships. We have limited the flow of supplies into the South to a point where we believe a sustained major offensive

effort could not be supported at the present time.

Our airmen have done and are doing a truly professional job.

VIETNAMIZATION

The Secretary touched briefly on the Vietnamization program and pointed out that the VNAF is already carrying out about 30 pecent of the in-country attack missions. Our plans provide for their 20 squadron force to be doubled in the near future.

The VNAF is equipped with UH-1H and H-34 helicopters, C-119s,

C-47s, F-5s, A-1s, A-37s, and some light utility aircraft.

They are doing a good job. The bombing accuracy of their F-5, A-1 and A-37 squadrons is on a par with our own squadrons. They are taking on an increasingly larger part of the in-country war. However, they are not able to do both the close air support and interdiction missions at present levels, nor should we expect them to provide South Vietnam with a sophisticated air defense. Consequently, we expect a significant Air Force commitment in Southeast Asia for a considerable period of time.

We have turned over one base to the VNAF and are reducing our presence at two more. Our basic approach is to have the Vietnamese work side by side with our people and then turn the job over to them.

Our Vietnamization concept has further emphasized the need to proceed with the development of an International Fighter Aircraft for the self-defense of our allies in Asia. This aircraft would be relatively inexpensive, simple to operate and maintain, and would provide a good capability as an air superiority fighter. We are now in the process of examining several candidate aircraft and have initiated planning for an accelerated acquisition cycle which could result in contract award in late fiscal year 1970.

PERSONNEL

Secretary Seamans has described the large reductions we have had to make in both our military and civilian personnel levels. These have been most difficult and will continue to cause considerable turbulence throughout the force.

Such large reductions over a short period of time seriously hamper promotion opportunities, disrupt the training base, and cause us to terminate prematurely our contracts with many fine reserve officers

who are on extended active duty.

In our current reductions we will do everything we can to minimize personal hardships. Thanks to the foresight of the Congress, readjustment pay will be a great help to many of these individuals. To better manage any future sizeable force reductions we need additional legislative authority which has been requested from the Congress. If enacted, it would authorize the Services to impose early retirement on as many as 20 percent of all regular lieutenant colonels, commanders, colonels, and Navy captains who have been twice deferred from permanent promotion to the next higher grade.

We are still having to carefully manage our rated officer force. The total rated officer inventory continues to decrease. Today, we have about 2,500 fewer pilots and 1,700 fewer navigators than we had 3 years ago. By the end of fiscal year 1971, our pilot and navigator inventories will be down another 1,700 and 900 respectively. The war in Southeast Asia further complicates the problem. Rated requirements there remain high, and this is compounded by the expanded pipe-

line for rotations and training.

We have taken action to meet the forecast long-term deficit of rated officers. Our annual production of new pilots will reach 3,500 this year and 3,900 in 1971. Navigator production has been 800 per year but is now increasing to an anual rate of 1,000. We are continually updating our long-range planning in an attempt to stabilize our production rates at a sustaining level to reduce the fluctuations which have been prevalent since World War II.

We are moving toward compliance with congressional wishes that the Air Force discontinue training of pilots in helicopters after they have been trained and rated in fixed-wing aircraft. However, it will take at least a year to achieve first production of non-fixed wing trained helicopter pilots, and in the interim, continued helicopter training for some fixed-wing pilots will be necessary to maintain our Southeast Asia pipeline for Air Force helicopter pilots.

SUMMARY

As we enter the 1970's we face an environment characterized by an expansion of Soviet and Chinese capabilities, continued world crises, and increased competition for national resources. The Air Force finds itself having to do better, and more, with less.

In developing this year's budget, we have had to make some deliberate and painful trade-offs between force modernization and maintaining the forces we have in-being. We feel we have made the best com-

promise possible within the resources provided.

We must move forward on essential improvements to both our strategic offensive and defensive forces. We have MINUTEMAN III coming into the missile force and the initial procurement of the SRAM requested for the B-52. We urgently need your support for AWACS as we move toward a modernized air defense program. For the future I want re-emphasize our need for the B-1, improved fighters, and the continued evolution of our ICBM force.

I have stressed the requirement for a fighter force structure at a minimum of 23 wings and pointed out that the A-7 and F-111 will round out this force. For the future, the F-15 and the A-X represent essential steps to maintain the strength of our tactical air power. Our Air Reserve Forces, supplied with more advanced equipment, will be able to provide the modern augmentation we have so often required in the past.

In Vietnam our force continues to operate effectively. And while Vietnamization will relieve us of some in-country work, our own forces are needed for interdiction, air defense, and for B-52 operations.

Finally, I want to pay particular tribute to the men and women of the Air Force; the people whose determination and dedication—and plain hard work—have contributed so effectively to the security of the Nation; those people who, in the final analysis, make our weapon systems meaningful. I know them and I am proud of them—they are the Air Force.

NEW AIRCRAFT DEVELOPMENT

Chairman STENNIS. All right, that is very good. We will have our usual method now of questioning.

Going back to you first, Secretary Seamans, I will refer to the page numbers here by the record that I have before me. I was very much interested last night to read that this is the smallest buy that you had made since 1935.

Now I don't see how that is possible back that far. You have been

given a good many last year. What about that?

You are about to run out of new ones to buy anyway, aren't you? Secretary SEAMANS. It is time to develop some new aircraft.

Chairman Stennis. Yes.

Secretary Smamans. And that is what we are intending to do with our research and development funds. We would have and did recommend buying additional aircraft with our fiscal year 1971 funds in the original submission we made to OSD. However, as we went through the budget process, we found that it was not possible to fund more than the aircraft we show in the budget.

Now I certainly should point out, although I believe it is obvious that part of our problem is that to continue with the 81 C-5A aircraft, we need an additional \$544 million. That shows in fiscal year 1971 for aircraft procurement.

Chairman STENNIS. Yes.

Secretary SEAMANS. Which in effect are buying us no additional aircraft than we already have authorized, and this has of course further impaired our ability to buy the aircraft that we would have liked to buy.

AIRCRAFT FOR SOUTH VIETNAMESE

Chairman Stennis. Well, you will get over that hump sometime. You say there on page 3 that "over half of this buy is for aircraft which will be transferred to Southeast Asian forces." Do you mean our forces or other countries there or just what do you mean by that?

Secretary SEAMANS. I mean by that transfer to South Vietnam. Chairman STENNIS. By our forces in South Vietnam; is that right? Secretary SEAMANS No, I mean the transfer to the South Vietnamese Air Forces.

Chairman STENNIS. That is a part of the buildup there?

Secretary SEAMANS. Yes.

Chairman Stennis. Over half of them are going there.

Secretary SEAMANS. Particularly as I mentioned in my statement, the 180 helicopters—of which [deleted] are for South Vietnam—and also the F and RF-5As.

OVERSEAS BASING WITH C-5A

Chairman Stennis. Now on page 5, moving along a little fast, in

the middle of the page you have this sentence:

"We will not have to depend as much on overseas basing," that is with the C-5A transport. What bases are you talking about there not being dependent on? Maybe there are some we can take out.

Secretary Seamans. We have obviously attempted to take this into account in our budgeting and planning, and we are cutting down on some of our overseas bases. As an example, Tachikawa in Japan.

This is a statement, however, that supposes that we have the C-5s in operation, and so far we don't have them in operation and we have got to maintain our overseas bases until such time as we can really put the C-5 in the force.

Chairman Stennis. Could you give us a list of overseas bases now that you expect to take out due to the operation of the C-5A? I think that would make good news, and it would be a sound strong

argument on the floor of the Senate too.

Secretary Seamans. When I was in Europe last fall I reviewed with USAFE the role that the C-5A could play there and asked for the specific plans for using the C-5 to move cargo including outsize cargo in Europe and from here to Europe, and the resultant impact on our base posture there. I was told the relevant plans were still under development; so I am afraid we are not in a position to give you specific reductions at this time.

DEFECT DETERMINATION

Chairman Stennis. In discussing the F-111, you say: "We believe this to be an isolated occurrence." Do you think it was just something was the matter with that particular plane, and was not a basic defect

in the concept or the design that runs through others?

Secretary Seamans. That is the view of the people that we assembled to investigate this. We put together a group headed by Dr. Holt Ashley. These are people who are connected with our scientific advisory board, and they made a very thorough review of the material and structural problems. We were fortunate in that we found the two sections of the forging that gave way, and we could clearly see where this crack had started. It was a fault about an inch long and about a quarter of an inch deep. We believe that this crack occurred during the forging process. This is the kind of a fault that couldn't have shown up in the inspection methods that were being used, and I might say we are using the best methods that were available at the time.

We are now going back and looking at and intend to use some new ultrasonic techniques, and also, and I think I may have mentioned this in my statement, we are going to subject each one of the aircraft to a full 7.3 G load at -40° F. If there are these type cracks they will show up during that test.

Chairman Stennis. You have not established this to be an isolated occurrence or you would not have grounded the others, I assume,

but you do expect it to prove out that way.

Secretary Seamans. Yes, that is correct.

Chairman Stennis. And you are going through the whole list? Secretary Seamans. We frankly felt that with the notoriety of this airplane, that if it should happen that we had a similar failure, it would be practically catastrophic for the program. We also obviously didn't want to subject any of our air crews to unnecessary hazard, and felt it wise to proceed in what I consider to be a highly conservative fashion.

Chairman STENNIS. I wasn't critical. I think you did the right thing. You were talking about the cost of this wing fix, and you don't know the amount yet. Will that be at the expense of the Air Force or the manufacturer, or how will that be?

Secretary Seamans. The way the contract is written with General Dynamics, that will be on a 85-15 share basis, correction of deficiencies. The Government will pay 85 percent, the contractor 15 percent.

ADDED RESEARCH AND REPORTS

Chairman Stennis. In that same sentence you speak of adjusted procurement quantity. I really don't think you ought to ask us to pass on these until you have determined more about that wing, Mr. Secretary. We want another report from you on that, you and General Ryan, just as soon as you can. We are not rushing pell-mell into a markup of the bill, but we are trying to conclude all major hearings reasonably soon. So let's put that, Mr. Braswell, down as an item to check further with the Air Force about.

Secretary Seamans. Mr. Chairman, that seems highly appropriate. We will have in the very near term an accurate cost estimate for the tests. We are building three special test cells, for example, and then there will be the recurring costs for each aircraft, and we hope to have some test information within the next 2 months.

Chairman Stennis. Just as soon as you can please pass this along

Secretary Seamans. It is our belief, of course, that we will need this authorization both for the test of the aircraft and for either new aircraft, new F-111s or other aircraft if the F-111 should prove to be unsatisfactory, which I very much doubt.

Chairman STENNIS. I don't think we would be inclined to put things

in until we are fairly well satisfied with our recommendations.

SRAM BUDGET REQUEST

All of you say you are going to cut down on procurement until the testing is in better shape. You had to suspend your operations on SRAM. Still you are asking for \$99.5 million for your first quantity procurement.

Secretary SEAMANS. Yes, sir.

Chairman Stennis. How can you justify that much money when you are still not out of the woods on this trouble you are having with it?

Secretary Seamans. Well, we have had delays in our test program recently, in part because the supersonic tests are to be run by launching from the FB-111. We have released the one FB-111 for this purpose. The subsonic tests are primarily from the B-52. As I indicated in the statement, we have recently had two completely successful tests. We will have in the next 2 months approximately six additional tests, so that we believe we will be in a position to authorize production using the \$10 million procurement funds made available in fiscal year 1970 before the end of this fiscal year, and we believe it would be a great mistake not to move ahead and procure the first lot of these missiles in fiscal year 1971.

From the production standpoint we are set to go. We certainly don't want to go if there are any deficiencies in the missile, but we believe it is proving out, and we believe that, with the additional tests that will take place in the next few months, it will truly be in

position for this first lot of production next year.

Chairman Stennis. All right, that is fine. Senator Smith, may I call

on you next, please.

Senator Smith. Thank you, Mr. Chairman. Mr. Secretary, the Chairman has already spoken as to your budget request for aircraft. It is my understanding that you have in this bill a request for 390 aircraft. Will you provide, if you can't do it now, provide for the record just how these are allocated, the numbers to our own Air Force and to other nations?

Secretary SEAMANS. Yes, I would be happy to put that in the record. As I indicated previously, the helicopters and the F-5s are to be transferred to the South Vietnamese Air Force.

Senator Smith. I would like to have in the record the numbers as well as the types.

(The information follows:)

The procurement of 390 aircraft is allocated as follows:

Aircraft type	Air	Force	Vietnam	Laos	Thailand	Tota
A-70 F-4E FRIF-SA		88 24			••••••	8 2
F-111F RF-4C C-9A		40 12 9			1	4 1
T-41D T-X (Navigator Trainer). UH-1H		4	Deleted.]		{	18 1
U-17B		177			(39

CONTRACTORS' RESPONSIBILITY FOR AIRCRAFT FLAWS

Senator SMITH. I am not sure that I understand why the F-111 fleet was grounded. It is my understanding that they were grounded for structural flaws. Yet you are redesigning endurance items for this

plane. Isn't this the duty of the contractor?

Secretary Seamans. We have the same type problem with this wing casting that we have had in the space program in connection with Saturn V. These high strength materials, be they aluminum or steel, have a characteristic that they rip like cloth under certain circumstances, and the circumstances are caused by having some minor flaw that is very difficult to detect, but which when stressed in a certain way will cause the piece to let go very rapidly. It is a brand new art, the matter of fracture mechanics. I can't even call it a science at this time. We have a lot to learn about it, both as to what size crack will cause a piece to let go and under what circumstances. We also have a lot to learn about the testing, so I believe that in this circumstance a sharing of the cost between the Government and the contractor is satisfactory.

CLOSE SUPPORT ROLE

Senator SMITH. What percentage of the close support role belongs

to the Army?

Secretary Seamans. The close support role is the Air Force's responsibility. I didn't mention the Cheyenne because that is in the Army's budget. Let me just add, however, that in response to a request from Mr. Packard we are carrying out jointly with the Army a study on the possible role of the Cheyenne as compared with the A-X.

Senator Smith. The Army has no responsibility at the present time? Secretary Seamans. Well, as I said the other day, I find that I certainly have learned a lot about close support recently. There are a lot of ramifications to it, and to really understand it, it is necessary to get into a large number of specific tasks, their locale on the battlefield, the method of command and control, et cetera. In the joint study I just mentioned we are looking at these considerations, and I am not yet in a position to say what role the Army may have, because we still have this under study.

Senator Smith. May I ask General Ryan do you have anything to say on that as to whose responsibility this support is?

General RYAN. The responsibility for close air support rests with

the Air Force, Senator Smith.

Senator Smrth. I was reviewing some of the Army testimony, on the Cheyenne and the A-X and noticed that the Army was talking about the AH-56 performing direct air fire support. Is this an approved Army responsibility?

General Ryan. Not by the JCS publications.

Senator Smith. The Air Force has not approved the Army taking that over even in part, then?

General Ryan. No, Senator.

Senator Smith. Do you consider, General Ryan, the A-X and the

Cheyenne to be competitive or complimentary?

General Ryan. It is difficult to be absolute, Senator Smith. They are competitive, no question about it. But you could also make a point that in some areas they are complementary, when you go clear across the spectrum.

Senator Smith. What can the Cheyenne do that the A-X can't

General Ryan. I didn't understand, ma'am.

Senator Smith. What can the Cheyenne do that the A-X cannot

General RYAN. Vertical take off. If I might add, Senator Smith, in our design of the A-X, we have designed this aircraft specifically for the close air support role. We have designed survivability into it. That is something like a thousand pounds of armor. We have designed a large load carrying capability. It will carry up to 16,000 pounds of bombs, long loiter capability, it can take off with a 10,000 pound bomb load and loiter for [deleted] hours over the battle area. We are starting from scratch to make this a designated close air support aircraft for the Army.

Senator SMITH. I might put it the other way. What can the A-X

do that the Chevenne can't do?

General Ryan. It can survive, because we are designing survivability

in it. It can carry a larger load and can loiter longer.

Senator Smith. General Ryan, the Air Force started working on the A-X in 1966, and then OSD did some supplemental studies of the A-X, in September 1969, but it is my understanding that there has not been any release of the proposals for this. It has now been 6 months, since that last study. Do you have any idea when this will be acted on by the Department of Defense?

General Ryan. We have just submitted back to OSD within the past 10 days the final version of the development concept paper and we anticipate the decision on the development concept paper momentarily.

Secretary Seamans. Senator Smith, could I just add to that?

Senator Smith. Yes, if you please.

Secretary Seamans. As part of the decision-making, Mr. Packard asked that Secretary Resor and I set up a joint study. He and I have recently submitted an interim report to the Secretary of Defense, and Mr. Packard. In it we both agree that we should proceed with research and development of both the A-X and the AAFSS at least through prototype development, so that we know where we stand with these two types of vehicles. Digitized by Google

Senator Smith. And do you have money for this?

Secretary SEAMANS. We have money. We have \$2 million in fiscal year 70, and we are requesting another, I believe, \$27.9 million this year to proceed with the development of the A-X. Our intention is to run a flyoff where we will have two contractors, each of whom will build two aircraft, and the cost of that would run about \$60 million, I believe.

PREPARED QUESTIONS FROM SENATOR SMITH

Senator SMITH. Mr. Chairman, I will have further questions that I may want to submit for the record to be answered. That is all I have at the present time.

Thank you very much.

(Questions submitted by Senator Smith. Answers supplied by the Department of the Air Force.)

Question. Mr. Secretary, with respect to the C-5A, which of the alternatives now under consideration by the Government do you favor? And would you give us the reasons?

Answer. An intensive effort is underway within OSD and the Air Force to evaluate all of the alternatives and determine the most appropriate course of action. I am interested in a solution which will provide the airplanes we need at minimum cost. However, I am not, at this time, in a position to state which of the alternatives best satisfies these criteria.

Question. Mr. Secretary, a number of fixes are now in process on the F-111, according to your statement. How much of the costs associated with this work is being borne by the Government?

Also how much is in this budget request to solve those problems? It seems to me that this is solely the contractor's responibility?

Answer. As I stated earlier, the exact cost of the full F-111 Recovery Program is not known to us at this time since the overall extent of the final fix is not yet defined. We expect to know this cost, however, in the very near future. These fixes have been directed as correction of deficiency changes and in accordance with our contract with General Dynamics the cost will be shared on an 85-15 percent basis. That is, the Government will pay 85% and the contractor 15%. Our current plan is to finance the cost of the solution to these problems from the FY 1971 Appropriation by reducing the quantity of aircraft to be procured as necessary.

Question. My next question of the F-111 is if grounding the entire fleet was due to a structural flaw, why are you now redesigning the components for endurance when the aircraft has not been proven airworthy? Again, isn't this the responsibility of the contractor?

Answer. The structural flaw which caused the December 22, 1969 accident does not require a redesign of the component involved. The endurance or fatigue test program which determines the wing box structural life is not affected in any way.

As to the airworthiness of the aircraft, it is a responsibility of the contractor. All correction of deficiencies are negotiated under provisions of the contract which provide for 85-15 sharing by the government and contractor.

Question. Mr. Secretary, last year a Cuban MIG-17 landed at an Air Force Base in Florida as though it were a routine flight.

What has the Air Force done to correct this situation?

Answer. As you know, the EC-121s assigned to duty in the Florida Straits were reduced from 100 percent station manning to 35 percent random manning on 3 October 1969. The MIG-17 arrived on 5 October 1969 during a period when an EC-121 was not on station. On 6 October 1969, the EC-121s were returned to a 24-hour a day basis. This was later reduced to a random basis with concentrations of effort (100 percent manning) when the President is at Key Biscayne. We maintain a detachment of three EC-121s at McCoy AFB, Florida, to provide the random manning, and aircraft as necessary are brought from McClellan

AFB, California, to provide the 100 percent coverage during Presidential visits or other emergency situations.

Question. Mr. Secretary, in discussing the A-X close support aircraft you make no mention of the Cobra or Cheyenne gunships. Would you elaborate for the record on my earlier question on percentage of the close support role that the Army is taking over from the Air Force?

Answer. Because close air support of the Army is a mission specifically assigned to the Air Force, and because the Air Force is achieving an improved capability to fulfill its responsibilities in this area through acquisition of aircraft such as the A-X, I do not believe the Army needs to or should take over any part of that mission. We have agreed that light armed helicopters are useful in air mobile operations for defensive purposes and to provide light suppressive frepower. Frankly, our recognition of the utility of light armed helicopters for those tasks was based on an equal recognition of our own limitations in performing them. We are convinced that the introduction of the A-X into our force will reduce those limitations.

Question. Mr. Secretary, with the reduction in active force strength, the importance of the Reserve and Guard strength increases. You indicate that they too are being reduced in FY 1971. Wouldn't it be more prudent to increase the Reserves and Guard in these circumstances?

Answer. Yes, I agree, Senator Smith. Perhaps I can elaborate on my previous statement to clarify this point.

In the Air National Guard the average strength for fiscal year 1970 is projected at 87,046 and 87,878 for fiscal year 1971. The FY 1971 budget submission to the Congress for the AF Reserve proposes a revised average strength of 47,422 for fiscal year 1970 and 47,921 for fiscal year 1971.

In both components we are programming increases in strength in FY 1971 over the revised budget level in FY 1970. In addition, we have increased capability as the active force provides resources to modernize the Reserve Forces.

Senator SMTTH. I believe that the committee should query Dr. Foster as to the answer to this question. With your permission, I would propose that the committee staff draft a letter requesting that the OSD staff expedite release of the A-X request for proposals. We have studied this important airplane long enough. It is now time to build it.

Question. The A-X appears to have excellent survivability features. I know that the Air Force and Army are discussing the A-X and the Cheyenne, so you must be conversant with both systems.

Can you compare A-X survivability features with the AH-56?

Answer. The A-X has a maximum level flight speed in excess of 400 knots. The Army says that the Cheyenne will do about 212. The A-X has two engines. The Cheyenne has one. The A-X will have over [deleted] lbs. of armor. The Cheyenne about [deleted]. The A-X will have less than half the average vulnerable area to 14.5 mm guns and one-third of the vulnerable area to 57 mm guns. The A-X will be designed to pull 7.33 Gs. The Cheyenne can pull 3.5 Gs. Finally, to survive enemy ground fire, the Cheyenne is limited to earthhugging "nap of the earth" tactics which decreases target acquisition capability. The A-X, on the other hand, can hug the earth, perform shallow dives or steep dives, as the situation dictates. In summary, I would agree with Dr. Foster's comment to this Committee that "... there is no question about the ability of a fixed wing aircraft in a Close Support role to be able to endure a much higher intensity of ground threat than a helicopter" To this, I would also add that the A-X will have more survivability features than any fixed wing aircraft, and at a very low price of [deleted] million.

Question. General Ryan, how long, in your opinion, would hostilities remain conventional in Europe if the Soviets launched an all attack against NATO?

Answer. In the event deterrence fails in Europe, the current NATO strategy provides for an appropriate military response to any aggression with sufficient forces to successfully defend the areas under attack and to defeat aggression by making the cost and the risk disproportionate to the aggressor's objectives. If the Soviets were to launch an "all-out" attack, short of nuclear warfare, NATO forces would respond [deleted]. How long NATO forces could sustain

conventional combat and hold the aggressors in the face of an all-out attack is dependent on a large number of variables: Warning time, initial damages absorbed, scope and intensity of attack, etc. It is most probable that a maximum concentrated effort by Soviet forces in the Center Region of Europe would be quantitatively superior to in-place NATO forces. The ability to augment, resupply and reinforce those NATO forces from outside the theater would affect the duration of conventional operations.

Question. If the Air Force received three or four days strategic warning how long will the Air Force be able to sustain combat in Europe?

Answer. Our Current logistic concepts calls for [deleted] days prepositioned War Readiness Material (WRM) in Europe. After [deleted] days, resupply from CONUS is planned to meet our requirements. We presently have the capability to complete deployment of our planned force to Europe within [deleted] days; with the first of these forces arriving in Europe within [deleted] hours. Beyond these factors, our capability to sustain combat is affected by many variables. Variables such as the nature and scope of the Soviet/Warsaw Pact attack; the attrition to our forces and installations which we may experience; etc.

The Soviets' ability to conceal the massing of large forces and then quickly employ those forces in an effective manner was clearly demonstrated in Czechoslovakia. The possibility that they could conceal a planned attack against our NATO forces in Europe can not be precluded. Should the Soviets launch a full scale attack with minimum or no warning time, we would require augmentation of our European forces in order to effectively sustain combat operations.

Question. How many tactical aircraft are now in Europe and on how many bases are they located? Also, do you believe this number is sufficient to meet our NATO commitment?

Answer. We presently have the following tactical aircraft based in Europe:

	Numbers	•
Fighter squadrons (TFS)	(`	١
Reconnaissance Squadrons (TRS)		l
Airlift Squadrons (TAS)	[TD-1-4-37	l
Electronic Warfare Squadrons (TEWS)	[Deleted]	1
Special Operations Squadrons (SOF)		l
Total	(1
Of the above units, four TFS, [deleted] are dual-based in CONUS.	` '	
These units are presently based at the following locations:		
England:		
Alconbury Air Base		١
Bentwaters Air Base		l
Lakenheath Air Base		l
Mildenhall Air Base	1	l
Upper Heyford Air Base		l
Wethersfield Air Base	1	ı
Woodbridge Air Base		l
Germany:	1	l
	(Dalata a)	l
Bitburg Air Base	[Deleted]	ì
Hahn Air Base	1	l
Ramstein Air Base		l
Rhein Main	1 1	
Spangdanlem Air Base	!!!	
Zweiburken Air Base	1	
Netherlands: Camp New Amsterdam	1	
Spain: Torrejon Air Base	1 1	l
Greece: Athens	l J	,

With regard to our NATO commitment, we commit forces to NATO on a calendar year basis. Our 1970 NATO commitment is as follows: TFS [deleted]; TRS [deleted]; TEW [deleted]: TAS [deleted].

The differences between these figures and the ones discussed in the first part of my reply are caused by the following:

(a) An additional fighter squadron (air defense), that is stationed in Iceland, is also committed to NATO.

Sauadrons /

(b) As a result of the Czechoslovakian crisis, the U.S. formally committed to NATO an additional [deleted]. These units are based in the CONUS and can be deployed to Europe within [deleted]. We commit these units to NATO based on NATO Force goals which are established and agreed to by all members of the Alliance. We have consistently met our force goals in the past and are presently meeting them.

Question. What is the vulnerability of your tactical aircraft in Europe, recognizing that they are positioned on such a few air bases?

Answer. Our forces assigned in Europe are being provided protection from surprise low level attack with conventional weapons. This is our Theater Air Base Vulnerability (TAB VEE) passive protection program. Each aircraft is dispersed on base and protected with a steel and concrete shelter. Other war essential air base facilities are also being hardened and protected by other measures. These measures in total are designed to be complementary to the active HAWK/CHAPARRAL/VULCAN defenses being provided by the Army. Protec-

tion will be complete at our bases in Central Europe [deleted].

Protection of our augmentation forces which we plan to deploy to Europe in wartime presents a problem. We have an objective of basing not more than [deleted] squadrons per base in wartime. However, even after activating our stand-by bases we will average almost [deleted] squadrons per base in the critical Central European area. We are presently examining ways to reduce this problem. Co-locating some of our units on allied fields is one possibility. This has the advantage of having our allies pay a large share of support costs but it does increase command and control problems. Another area we are exploring is acquiring more stand-by bases. These are bases which are maintained in a caretaker status during peacetime and can be brought up to operational standards with augmentation in about two weeks time. We also have a limited capability to deploy to a completely bare base; just an operational runway and a source of potable water.

It is through the combination of dispersing our forces over numerous bases while at the same time hardening our inplace forces that we believe provides the best means of reducing force vulnerability.

Question. What percentage of your tactical fleet in Europe is configured for the delivery of nuclear weapons?

Answer. All [deleted] tactical fighter squadrons (which includes four dual based F-4 squadrons) assigned to Europe are capable of the delivery of nuclear weapons. A [deleted] squadron, presently equipped with F-102 aircraft with a primary role of air defense [deleted]. Upon conversion of this squadron, the entire USAF fighter fleet in Europe will be capable of nuclear delivery.

As of 12 March 1970 the tactical fighter force was composed of [deleted] F-100 squadrons ([deleted] aircraft) and [deleted] F-4 squadrons ([deleted] aircraft). [Deleted] of the total force of [deleted] are on continuous Quick Reaction Alert (QRA) status.

Question. General, would you tell us briefly what is the combat readiness of the Air Force strategic forces?

Answer. The strategic missile wings remain in a high state of readiness. However, the B-52 alert force is degraded due to shortages in aircrew personnel and to the commitment of aircraft and crews to contingency operations in SEAsia. We have a commitment for [deleted] percent of the B-52 force to be on ground alert. Presently we are maintaining only [deleted] percent of the total force on a day to day alert posture. In case of strategic warning we would be able to generate a large majority of the remaining force within [deleted] hours.

Chairman STENNIS. Thank you, Senator.

Senator Symington.

Senator Symington. Thank you, Mr. Chairman. I would also ask permission to submit questions for the record.

Chairman STENNIS. All right.

(Questions and answers appear at pages 1041-1043.)

C-5A UNIT COST

Senator Symington. Mr. Secretary, on page 6 you say "if the Air Force wins all the arguments the 81 aircraft program will cost about \$4 billion." That is the C-5A including initial spares. As I get it, that is about \$50 million a plane.

Secretary SEAMANS. Yes, that is correct.

Senator Symington. And it will be increased \$500 million more if the contractor wins all his points. But that statement is not based on any future extrapolation, based on the problems. In other words, it could be \$75 million a plane, could it not, as things are going? I wouldn't want you to leave it at this figure unless you are sure.

Secretary SEAMANS. Our estimate does come out at this time at about \$4.3 billion, allowing \$400 million for contingencies, but I would agree with you that it could run higher than that for the 81 aircraft. However, we have set up to look not only at the structural problems but the avionics problems and the operational problems and performance, to see where we might start a trend the other way, to reduce the cost below this figure by reducing the requirements particularly in the avionics area.

VARIABLE SWEEP PLANE

Senator Symington. Thank you. Now, as I understand it in the excellent hearings that Senator Cannon has been chairing there are two problems. One is that of the cracking of material. This I followed. There were five companies involved before the last machining. You

say you have improved inspection. That is fine.

The second problem, however, apparently has to do with wing stress. Is there any plane known in the world today which has moved its wings successfully over a period of years? I notice you went to fixed wings on the F-15, and I was delighted, based on what I know about it. Do you know any plane, or does the General know of any plane, that handles the wings, and has been successful?

Secretary Seamans. You are talking about the variable sweep of

the F-111.

Senator Symmoton. Variable sweep, right.

Secretary SEAMANS. As far as we are concerned this is the first attempt to build such an aircraft. I understand that the French have built a variable sweep plane. I don't happen to know what their experience has been.

Senator Symington. In the Mirage field?

General Ryan. Yes.

Senator Symington. Are they selling it, manufacturing it?

Secretary SEAMANS. I believe it is still prototype and of course we know that the Russians are also testing a new aircraft with variable sween.

Senator Symington. If there is any plane that has been tested out to satisfaction with a variable sweep wing will you put that in the

record at this point?

Secretary SEAMANS. I will be happy to.

(The information follows:)

The F-111 is the only aircraft the U.S. Government has placed in production with a variable geometry wing. However, an experimental variable sweep aircraft designated the Bell X-5 provided much of the early technology that went into the design of the F-111 variable wing. Although this government has no complete test data relative to the experience of other countries with this design, available information indicates the French Mirage G and G4, and the Russian Flogger and Fitter B have successfully incorporated variable sweep wing designs.

MAVERICK DEVELOPMENT

Senator Symington. On page 12 you talked about the MAVERICK. I have been optimistic about the importance of a weapon of that character. You say it is going well. Does it look as if this will be an

effective weapon?

Secretary Seamans. Yes, it does. The tests of the subsystems were very encouraging. We are planning to buy it in considerable quantity. It has a terminal homing, electro-optical device. We have just started on our flight test program and I have one series of graphs where we are firing at a tank with the gun barrel pointed up and it actually hit the end of the gun barrel. We believe that we have something that we have required for a long time but haven't been able to develop.

MINUTEMAN SURVIVABILITY

Senator Symington. Speaking of missiles, I was impressed, in an intelligence briefing, with the progress the Soviets have made with movable missiles; not on railway cars, on trucks. When you consider that 75 percent of Utah and 68 percent of California are owned by the Federal Government, you have a lot of wasteland where you could put a movable MINUTEMAN and end a lot of these arguments about such things as ABMs and SS-9s.

In other words, a land POLARIS. It would end a lot of arguments

and expense if it could be done effectively.

[Deleted.]

Secretary SEAMANS. We have \$77 million in the budgeted research and development money to study this and other ways of improving the survivability of MINUTEMAN. In the area of mobility, what we are considering in the study is that we would have a number of, call them, garage-type structures that would be within a relatively limited area but far enough apart that no one nuclear burst would destroy more than one of them, and in this way raise the ante as far as the Soviets are concerned by obviously the number of shelters that are available.

Senator Symington. I can't imagine anything more important to the maintaining of second-strike capability; and think of the billions of

dollars it would save.

SIMPLICITY OF F-15 PROGRAM

On page 17 you talk about the F-15. I would hope you all keep this airplane relatively simple, and not tack a lot of high-class theory on it.

With the chairman of the Tactical Subcommittee, we spent a day at McDonnell. It looks like a clean airplane. Are we going to try to keep it that way, or are we going to load it up with a bucket of theoretical scientific stuff that can only get us into further trouble, cost maintenance, problems in actual operation.

Secretary Seamans. Let me say that what you saw is the result of our being hardboiled during the competition phase. After the proposals came in we felt the avionics were too complex and too costly, and we made reductions in our requirements which we sent out to all the contractors. We estimated this would reduce the cost on the order of \$1 million an aircraft, and we have been very hardboiled at keeping this a single-purpose airplane. We did finally agree to put hard points into the wing but that is as far as we have gone. We intend to ride herd on this matter.

CHEYENNE AND A-X PROGRAM COSTS

Senator Symington. Fine. As to page 18, it is clear there is an argument developing between the A-X and the Army Cheyenne; and the Army comes up with another chopper they call the Chinook, which is going to attack troops. I remember what a former Chief of Staff of the Army told me when we saw a field test of something like this.

Senator Stennis was there when they had helicopters attack ground troops. I couldn't put in the record the language of this former Chief.

I asked the Army if they planned to use these Chinook in such cases as to attack ground troops in case of war in Europe. They said

ves; that was the plan.

It seems someone is wasting a lot of time and money to try to take over the Air Force mission. They have their own mission, a very large and important one. Senator Smith asked what the Cheyenne could do the A-X could not do and you said go to vertical lift. Of course, you have a happy compromise with the Harrier, which can do both, V/STOL as well as STOL and VTOL.

The cost of the Cheyenne is high. I do not know the cost of the A-X. Would you file for the record the estimated cost of both?

What is the estimated cost of the Harrier? Is it in the same ball

park?

Secretary Seamans. We are estimating the unit flyaway cost of the A-X at about [deleted] for a buy of [deleted] aircraft. The unit production cost, to include flyaway, initial spares and peculiar support, is estimated at [deleted] million for this number of aircraft. The R. & D. costs for the A-X are estimated at \$194 million for the competitive prototype development approach. These estimates are based on 1970 dollars.

The initial buy of 12 Harrier aircraft for the Marines was \$33.3 million for a unit flyaway cost of \$2.8 million. If the spares, \$15.3 million, and support, \$9.0 million, are included the unit production cost would be about [deleted] for these airplanes. The initial buy is from the United Kingdom. We understand that if approval is received for follow-on buys, an arrangement for building the airplane in this country would be made. Under this agreement the unit flyaway cost of the proposed fiscal year 1971 buy would be about \$4.2 million because of the royalties and costs of initiating production in the United States. The added cost for U.S. production will no longer apply after the 102d U.S. production aircraft. There are no R. & D. costs associated with the Marine buy of the Harrier.

Since the production contract on the Cheyenne was canceled last year, we have no up-to-date information on the unit or R. & D. costs of this system; however, we understand that the unit flyaway cost was at least [deleted] million at that time (based on a [deleted] aircraft buy).

Secretary Seamans. I understand the Chevenne is now around

[deleted], and the A-X we are estimating around [deleted] million. Senator Symington. That is less than I had heard for the A-X. But I would hope also you could work out something more definite about design and mission with the Army. This fight started over 15 years ago. It all ended up with the Army having the Caribou, Canadian made, and the C-123, neither of which were designed by the Air Force.

You mentioned nine new fighter planes the Soviets have. They also have two mach 2-plus STOLS, and one subsonic VTOL. We have photographs, so they are a long way ahead in this field. To me it would seem especially unfortunate if the Air Force wants to maintain mission control of tactical air support.

VIETNAMIZATION PROGRAM

We talk about Vietnamization. Mr. Secretary, on page 22 you have

this interesting sentence:

"Vietnamization is our most important program in Southeast Asia." I noticed in General Ryan's statement, following Senator Smith's question, that only 177 of these 390 aircraft are being bought for our own Air Force; the rest for someone else. I would ask this question. General Ryan, you can answer it also, however you all would like to handle it.

They talk about a high of 550,000 American military in Vietnam at one point in the Johnson administration; cut to 430,000 in this administration. Now these figures are sort of silly, because when we had 550,000 in Vietnam we also had 65,000 in Thailand, 60,000 to 70,000 in the fleet, thousands upon thousands of American military in the Philippines, Guam, Okinawa, Japan all working exclusively on the Vietnam war. None of these figures include the people back here producing equipment for Vietnam. The truth is the figure runs close to 800,000 people involved in Vietnam, not counting those at home.

What worries me about Vietnamization is, if we can't do it with 800,000 fine Americans plus the South Vietnamese Army, how in the name of heaven are we going to be able to accomplish more without those 800,000 Americans; with, in effect, the Thieu-Ky military alone?

I don't understand how it is possible to achieve success by adopting a policy of that character. This is especially true because we asked if the same rules, regulations, and restrictions that have been applied against our military would be in effect against the South Vietnamese. The record will show that the answer was yes if we put up the money.

Well, we are sure going to put up the money. The figure for this socalled Vietnamization runs about \$7 billion in 5 years, a rough

estimate.

How do you expect any success under this program for eliminating all these Americans and leaving it up to the South Vietnamese?

That is the question.

Secretary SEAMANS. That is certainly a very good question, and obviously one that is very difficult to answer. South Vietnam has a population of about 18 million. The plan calls for approximately 1.2 million men under arms as of the time that we would be reduced down to some minimal level.

As far as their air force is concerned, the plan calls for an increase from the present 21 squadrons to around [deleted] squadrons. Admittedly this force is for in-country operation. It would not give them a capability of interdicting the Ho Chi Minh Trail. It would purposely not give them a capability of being aggressive, going up into say North Vietnam. There is no question but what the force that they will have when they have 1 million men under arms is not the equivalent of their force plus the 800,000 people from the United States. It won't work unless at the same time that we draw down, pacification progress continues, the North Vietnamese do not escalate their efforts, and the RVNAF improve as programed.

In my personal view I believe it is essential from the standpoint of

the United States that we proceed in this direction.

Chairman Stennis. All right, thank you, gentlemen. Senator Symington. Thank you, Mr. Chairman.

I would make one observation; that is I am not sure my question has been answered. Let us not pursue it. But if anybody believes that without these 800,000 of our finest youth, and under the same restrictive rules, these people can be successful where we have failed, it is an obvious denigration of the capacity of our own Armed Forces, totally unfair and pretty ridiculous.

Chairman STENNIS. All right, thank you, Senator.

Senator Murphy, that brings us to you, sir.

POSTWAR VIETNAM POLICY

Senator MURPHY. Just to pursue the questioning that my distinguished colleague has opened, is that decision, to proceed under the same rules after Vietnamization, constant with the wishes of the military?

Let me simplify it. I believed over the years that, had our military been able to proceed as they wished, they would have been through 3 years ago. I haven't heard anything to the contrary. Now we are going to restrain these people in the same manner; is that the plan?

General Ryan. I don't believe the details have been worked out. I

don't think I am in a position to answer, Senator Murphy.

Senator MURPHY. Who would be responsible for working out the details?

General Ryan. It would be national policy. It would probably

come out of the National Security Council.

Senator MURPHY. When could we expect that policy to be decided? I think this is vital. I think this is nonsense to go through the motions of training a fighter and then say you get in the ring but don't you hit the other fellow, and I think about 97 percent of the American people feel the same way.

Secretary SEAMANS. It is obviously a complex policy matter that

has been under----

Senator Murphy. I will take it up in my own way. I don't mean to embarrass you, General.

Secretary SEAMANS. It has been under review long before General Ryan and I appeared on the scene in the Air Force, and we are living with those restrictions right now. I think it is totally inconceivable today that we would change those restrictions as far as the use of our own forces.

Senator Murphy. What is that, it is not conceivable?

Secretary SEAMANS. I doubt that you could change those policies today.

Senator Murphy. Why?

Secretary Seamans. Because I don't believe it would be acceptable politically. That is my view. Far be it from me though to——

Senator Murphy. I am a politician. I would disagree with that,

Mr. Secretary.

Secretary Seamans. Far be it from me to make a political suggestion to you, sir.

F-111 FORGING PROBLEMS

Senator MURPHY. I think I have had my answer. Let me ask you this. Is it your feeling with the F-111 that the fault was in forging, or was it a metallurgical problem or an engineering design problem, or do you know?

Secretary SEAMANS. I think there is no question that the fault is

in the forging.

Senator Murphy. Yes.

Secretary Skamans. And it resulted, the crack appeared during the forging process, we believe, as near as we can tell.

Senator Murphy. In other words, in your judgment the engineering

and the design is all right?

Secretary SEAMANS. Yes. I think it is basically a quality control problem and the difficulty is that inspection techniques are hardly sufficient to determine that size crack.

ENGINEERING RESEARCH COMMISSION

Senator Murphy. One other question. I see that there is a commission being put together to go into this. Are these engineers headed up by an engineer from MIT? I know at MIT they have very good ones and some that are not very good. Are these men familiar with the particular problem? Is this the best judgment or is this another commission that is going to go in and study and come up with reports?

I will say quite frankly since I have been here in 5 years I have never heard of so many studies, so many reports, so many commissions,

and so little hardware that really works.

Secretary SEAMANS. On both the F-111 and the C-5 we have technical teams put together. It is the C-5 team that is headed by the Dean of Engineering at MIT.

Senator Murphy. Are these put together on a political basis or

an engineering basis? I understand that

Secretary Seamans. It has nothing to do with politics.

Senator Murphy. I understand that you are under great pressure. So are we from the press, and I would hope that the considerations are not being affected in any way by the columnists and the press.

Secretary SEAMANS. I can assure you they are not. It happens that Ray Bisplinghoff, who is dean of engineering, worked with me in NASA for two and a half years. He and I worked in the same department at MIT for about 15 years.

Senator Murphy. Then you know all his stresses?

Secretary SEAMANS. I know his stresses and I know how hard he works. He agreed to take this on in addition to his other duties provided he could work primarily weekends and I assured him the Lockheed people would be there any day he was available including Saturday and Sunday.

Senator Murphy. Thank you very much, Mr. Secretary. I have no

further questions.

Chairman Stennis. Thank you very much.

Senator Cannon.

Senator Cannon. Thank you, Mr. Chairman.

WEAPONS SYSTEMS AFFECTED BY STRATEGY CHANGE

Mr. Secretary, what specific weapons systems or equipment were eliminated from your 1971 budget request as a result of the change in strategy announced by Secretary Laird from the two and a half

wartime strategy to a one and a half wartime strategy.

Secretary SEAMANS. I think the answer to that is that we didn't remove anything for that specific reason. My own observation is that we were never truly armed for two and a half wars. I think now we are just being more realistic about what it takes. We did, as I mentioned in my statement, eliminate some items from our budget, but it wasn't on that basis. It is just a question of available resources.

Senator Cannon. Wouldn't it be reasonable to assume that if we changed from a two and a half war strategy to a one and a half war strategy that we wouldn't need the same amounts of materiel and equip-

ment in our budget?

Secretary SEAMANS. I think if you look back over what has happened in the Defense Department in the last 8 years or so, you find that each year the Joint Chiefs came in with about a \$100 billion budget and it was pared down to say 75 on the average, just because the Joint Chiefs were really talking about two and a half wars and what we were really budgeting for was the one and a half war situation.

I just don't think we were ever truly equipped nor did we have the

manpower to engage in two major wars at one time.

Senator Cannon. Do you think that this present budget actually equips us to engage the one and a half war strategy, or are we still below the requirements for a one and a half war strategy.

Secretary Seamans. I think, at this point, that we are, but I would

like to have you hear from General Ryan.

Senator Cannon. General?

General RYAN. Again it is difficult to deal in absolutes. If you wanted to be absolutely sure you would require more. As we are budgeted—yes, we have some risk, even for a one and a half war.

Senator Cannon. So what you are saying is that you don't have as

many risks on a one and a half war-

General Ryan. As you do on the two and a half.

Senator Cannon. As you did on the two and a half; is that it? General Ryan. Exactly.

Senator Cannon. But as far as actual hardware is concerned we are not spending less money this year because it is a one-and-a-half-war strategy than we were when it was a two-and-a-half war strategy and we are not buying less equipment because it is a one-and-a-half-war strategy vis-a-vis a two-and-a-half-war strategy; is that correct?

Secretary Seamans. That is my personal view.

PROJECTED 5-YEAR DEFENSE PLAN

Senator Cannon. Is it correct that the Air Force has no 5-year defense plan this year?

Senator SEAMANS. No; we have 5-year projection.

Senator Cannon. You do have a 5-year projection. You have carried that on this year.

Secretary SEAMANS. Yes; we have.

Senator Cannon. The Air Force had 23 tactical wings under the two-and-a-half-war strategy. General, from your statement I take it that you feel that the 23 wings are still essential under the one and a half war strategy; is that correct?

General Ryan. Yes, sir. We formerly asked for [deleted] wings under the other strategy, and we need the 23 wings for this strategy,

for our world-wide commitments.

Senator Cannon. Do you need more than the 23 wings for the one-and-a-half-war strategy?

General Ryan. I would say that the risk would be less if we had

[deleted] wings.

Senator Cannon. Could you adequately handle the requirement if you had less than 23 wings?

General Ryan. I don't believe so, Senator Cannon.

Senator Cannon. Is there any plan in the Air Force that you know of now to reduce below the 23 wings?

General Ryan. There are no such plans in the Air Force.

F-15 COST REDUCTION

Senator Cannon. Mr. Secretary, the F-15 program director at one time, felt the F-15 was getting too expensive. I understand that you authorized more of the off-the-shelf type of equipment be used, and that the aircraft would subsequently be reduced in price, by I thought, about \$1.6 million. I think you used a little different figure than that. Would you explain a little more in detail the circumstances surrounding that price reduction?

Secretary Seamans. I can explain the procedure we went through and I can submit for the record if you would like a list of all the items that were either changed or removed from the aircraft, because there were a fairly large number of items that were affected, I guess on the

order of 25.

(The information follows:)

ACTIONS TAKEN TO HOLD DOWN F-15 COSTS

Air vehicle

Delete Windshield Bird Proof Requirements.
"Fail Safe" In Lieu of "Fail Operational" Flight Control System.
Use F-105 Escape Seat Technology.
Install M61 Gun (Provide for 25MM Gun).
Delete Nuclear Curtain.
Delete Pressure Suit.
Delete Voice Warning.
Eliminate Soft Field Landing Requirement.

Evaluate Material Usage.

Miscellaneous Other Items.

Other

Reduce Training Requirements. Reduce MIS Satellite Complex. Reduce Data Requirements.

Avionics

Replaced Vertical Tapes With Round Dials.

In the Radar:

Deleted parametric amplifiers.
Deleted low PRF long range mode.
Reduced threshold of sizable clutter.
Simplified digital signal processor.
Reduced air-to-ground map range.
Deleted inflight fault isolation.
Hydraulic boresight eliminated.
Reduced computation requirement, eliminated one computer.
Using off-the-shelf communications equipment.
Reduced inertial navigation accuracy requirements.
Using off-the-shelf navigational instrument.
Reduced IFF and TEWS packages.

Test

Test Integration (Combined Testing Where Common Instrumentation).
Reduce Flight Test Hours.
Reduce Spares and Spare Parts.
Modify Systems Demonstrations.
Delete High Performance Test Bed.
Reduce Air-to-Ground Delivery Qualification.

Secretary Seamans. It was not only General Bellis who felt that the cost was too high. We certainly felt that way in the Air Force, and there was of course considerable pressure from OSD to get the price down. We looked at all aspects of the F-15. We looked at the structure, the materials that were to be used. We looked at the size and shape and we looked at the number of engines as well as larger numbers of electronic equipment.

As a result of doing this, we just went through it one by one, first within the Air Staff and then in turn went through all of these items with System Analysis, D.D.R. & E., and Mr. Packard himself, before reaching agreement that these items would be eliminated. And then officially went out first to the project office and then in turn officially out to the contractors to rebid on the basis of these changes. It was done very formally, and we made sure that we had a good cost trace from each contractor on why he estimated that it would cost less.

They all came in with less. McDonnell Douglas came in with the greatest reduction, however, and this was not a major factor I would say in the determination, but their reduction pretty closely coincided with what we had estimated.

Senator Cannon. Do you feel that the compromises in equipment on the F-15 will in any way affect its operational capability requirement? Secretary Seamans. No, I don't; not as an air-to-air superiority

fighter.

General Ryan. Could I just add, for instance, that we put round dials in instead of taped instruments. This is on the order of something

like \$15,000 per airplane.

Senator Cannon. Do you feel that the 150-percent ceiling price as authorized in the contract is a reasonable one considering the risk involved when we consider that most of the other government con-

tracts have a ceiling price of less than that amount?

Secretary Seamans. With the C-5 experience that we had and, with the complex reset formula, we felt that we just didn't want to get involved in anything like that again. For this reason we asked for a bid that included the R. & D. software, 20 test aircraft, and the first wing of the F-15s. We obtained "not-to-exceed" ceiling price options for wings one and two which are contractually binding.

We felt that since this was stretching out over a period of time, since frankly we are pushing in a number of areas into some unknowns, if you will, that we had to provide, if there was to be a ceiling, on the order of a 50-percent figure over target. Otherwise we would have

to get into the very complex formula, as I have said earlier.

I believe this was the best compromise.

Senator Cannon. Do you believe that the delay that will occur as a result of a longer period of R. & D., and insuring that the technological milestones have been met prior to production, do you think that that

is a justification?

Secretary SMAMANS. The fact that there may very well be inflation over the next 5 or 6 years during the term of this contract is of course a reason for putting in a 50-percent figure instead of a much lower figure. The fact that the contractor cannot go ahead with the production until we unilaterally decide that he has satisfied the milestone points is another reason that he could not commit himself to going ahead without a figure, a ceiling figure that is well over target.

Senator Cannon. General, how many F-15s do you desire to

purchase?

General RYAN. We would like [deleted] production aircraft.

Senator Cannon. Has OSD approved that number?

General Ryan. No, sir.

Senator Cannon. This is just a planning figure; is that correct? General Ryan. That is correct.

ADDITION OF FOUR WINGS

Senator Cannon. With reference to the Λ -7, the figures in here for the Λ -7, are they based on the three wings that we have been talking about, the three wing mix so far?

General RYAN. That is in the statement?

Senator Cannon. I was just using your chart of what you are going to acquire here this year.

General RYAN. Yes, sir.

Senator Cannon. You don't contemplate anything different than the three wings we have been talking about up to this time?

General Ryan. That is correct, sir.

Senator Cannon. Mr. Secretary, I think you said in your testimony that the Air Force would get three wings of the F-111s.

Secretary SEAMANS. I made a mistake. I should have said four

wings.

Senator Cannon. I was going to say in our discussion with General Boylan, I think we arrived at the conclusion or at least he did that even with the reduced buy, that still while it would be very tight that he still could come out with four wings of the F-111s.

Secretary Seamans. While we recessed I talked to the recorder and

he has already changed it to four.

Senator Cannon. I see. I am sorry.

Chairman Stennis. We have to change it in our heads too, you see. Senator Cannon. General, is it your best judgment now that the number of wings of A-7 aircraft within this 23 wing mix is the three wings that we have heretofore talked about?

General Ryan. Yes, sir.

Chairman Stennis. Senator, did he say that would complete those three wings, this buy here?

Senator Cannon. No; the buy here would not complete the three,

A-7 wings; would it?

Senator Symington. Would the Senator yield?

Senator Cannon. Yes, sir. We should get his answer.

General Ryan. Yes, sir; three wings.

Secretary SEAMANS. Does this complete the buy? General RYAN. No; there are 97 in fiscal year 1972.

Senator Cannon. That is right, so that the A-7s in here do not complete the buy for the three wings.

General RYAN. That is correct.

Senator Cannon. There would be a follow-on buy in 1972 to complete the three wings.

plete the three wings.
General Ryan. That is correct.
Senator Cannon. Now I yield.

PREPARATION FOR A CONVENTIONAL WAR STATUS

Senator Symington. We have become enmeshed in a new kind of war if one can call it a war. We have lost 1,500 helicopters over there, but now are getting the idea that with helicopters a lot of things can be done that were never done before. It astounds me, all this talk about helicopters fighting against ground troops in, say, northern Prussia, the plains of Prussia.

Doesn't it worry you, not only the nature but also the degree of the way we are creating conventional forces, in the air, as well as on the ground, to fight against Vietnam, instead of what we should be buying if we were ever to have a conventional war against a first-class

power?

General RYAN. We are not, Senator, figuring our forces solely to fight the Vietnamese war. We have gone for the F-15, for an air superiority fighter, in order to counter the Russians. In the interim we

have the F-4 until we get the F-15. With a mixture of the F-4s and the A-7s, and we have talked of this before, I think it gives us a mix we need to fulfill the requirement that faces us.

Now it isn't a question between the F-4 and the A-7. If you could only buy one, you would buy all F-4s. But after you have so many F-4s, then the A-7 has certain qualities that the F-4 doesn't have.

When we took the F-4s up over North Vietnam with bombs we

had to escort them. We are going to have to escort the A-7.

Senator Symington. If the Senator will yield for one more observation?

Chairman STENNIS. The time is up.

Senator Symington. I worry about the emphasis now being given helicopters for attacking enemy ground forces. But you can't have it both ways. The very arguments used for the A-X against any chopper are the same type and character of arguments you could use against the A-7, regardless of extrapolations, and especially in that you put in your own statement the fact there are nine new fighter planes developed by the Soviets.

I thank Senator Cannon.

TYPE OF METAL IN F-111

Chairman Stennis. All right, gentlemen, the time is up. Senator Goldwater.

Senator Goldwater. I just have a few questions, Mr. Chairman. What is the name of the steel used in the forging of the 111?

Secretary Seamans. D6AC, I believe.

Senator Goldwater. Isn't that the same metal used in the 747?

General Ryan. There is some of this metal in the 747.

Senator Goldwater. And also in the new McDonnell Douglas DC-10?

General Ryan. I don't know about the DC-10. I do happen to know

that they used some of this metal in the 747.

Senator Goldwater. How long would you plan to give the 7.3G. static test? Say you found no trouble with the first two dozen. Would you plan to continue giving that before they go into service?

General Ryan. I think we are going to have to until we can get a

reasonable statistical samples.

Senator Goldwater. I can understand the reason, but it is a heck

of a way to beat up an airplane before it ever gets in the air.

General Ryan. We hope that we can develop nondestructive inspection techniques which would pick up these flaws. Under the sonic technique, which were being utilized on the wing fittings, we found that they just would not pick it up, and there is a great deal of work going on in developing this type of tester at the present time.

PILOT SITUATION

Senator Goldwater. General, on page 17 of your statement you get into the pilot problem, and your production is going to 3,500 this year and 3,900 in 1971. Is that a high enough rate to sustain the pilot needs?

General Ryan. We are short of pilots today. With a 3,900 rate projected out, we get better, but 3,900 in 1971 will not get us well.

Senator Goldwater. Is this a result of the extreme cut in pilot training in the early sixties?

General Ryan. Yes. It is a result of that.

Senator GOLDWATER. Do you know offhand how many rated pilots you have now in the Air Force?

General Ryan. Roughly 35,000. I will supply it for the record but

it is right at 35,000.

Senator GOLDWATER. Do you know how many the Army has?

General Ryan. No, sir; I do not.

Senator GOLDWATER. I wonder if you would mind getting the Army's and the Navy's and putting that in too.

(The information follows:)

The Services use only the inventory of pilots in grades below colonel or captain (Navy) in computations pertaining to pilot requirements versus inventory. The following table shows the rated pilot inventory of each service in two groups and in total.

	Lieutenant colonel/ commander and below	Colonel/ captain and general/ Admiral	Total
Air Force: Feb. 28, 1970	35, 745	4, 254	39, 999
	23, 330	241	23, 571
	13, 150	1, 392	14, 542

OV-10 MODIFICATION

Senator Goldwater. General and Mr. Secretary, this is a question—I don't ask this because I am inclined favorably toward it but I have been asked this by people in the industry and by pilots of our own and the other services.

Could the OV-10 be modified to become an A-X?

Secretary SEAMANS. Not in my view. It was built as a counter-insurgency airplane. It is being used now for forward air control. It is a plane that has worked out well for this purpose. It does not have the survivability. It doesn't have the loiter. It doesn't have the payload capability that we are talking about for the A-X.

Senator Goldwater. I was talking about an improved version.

General Ryan. We have talked and have seen the brochure on the improved version, Senator, and the aircraft just doesn't have the qualities. It doesn't have the loiter or load-carrying capability.

A-X RISING COSTS

Senator Goldwater. One more question on that A-X. I talked a bit about this in the Tactical Air Subcommittee. This is a relatively inexpensive airplane. You are getting into a price here that corporations pay for airplanes, that some private individuals pay for airplanes. Couldn't this be developed as an off-the-shelf type of buy without our going into what is it, \$68 million for development purposes?

I can imagine companies like Cessna and Beech being interested in something like this without our having to spend so much money.

My interest here is merely in saving some money.

Secretary Seamans. Of course the development runs to more than the 65 or 70 I mentioned. The flyoff would cost that amount, and then the prototype development including the avionics and so on will run in excess of another \$100 million, but the total comes out to around, this type of procurement, around \$195 million.

General RYAN. Mr. Secretary, that includes four prototype and 10

test, 4 plus 10.

Secretary Seamans. Fourteen aircraft all told before going into production. And I don't think we can expect that the industry could support this, particularly today when they are having considerable difficulty borrowing money.

Senator Goldwater. I was just interested in it because you are talking about [deleted] million. Even if it went to [deleted] it is still an

inexpensive airplane.

General Ryan. The requirement for G. loading, structural requirements in order to carry the heavy load would not make it a good commercial venture. I mean when you are talking of Cessna that we could buy something off the shelf. I think this is the driving factor plus the survivability features that we are trying to build into the aircraft.

CANNONS IN FIGHTERS

Senator Goldwater. One more question on the F-15. Have you emphasized the cannon a little more than you have in the other fighters?

Chairman Stennis. What is that, Senator?

Senator Goldwater. The cannon. Every fighter pilot I talked to in

Vietnam says, Why can't we have some cannon?

General Ryan. Eventually we would like to go to a 25 millimeter. We are sizing the airplane to take that type but we are planning on putting the 20-millimeter internal gun on the F-15 until the 25-millimeter gun is fully developed.

Senator Goldwater. I have no other questions, Mr. Chairman. I

think they have made a very good presentation. Thank you. Chairman Stennis. I thought so too, Senator. Thank you.

SATELLITE SURVEILLANCE SYSTEM

Mr. Secretary, if you will turn back to page 14 of your statement, it says "in the astronautics area a new satellite strategic surveillance system is of first importance. The plans for [deleted] will further insure our ability to repel nuclear attack."

Does the Air Force operate the satellite surveillance? Secretary Seamans. Yes; we will operate it [deleted].

Chairman STENNIS. I haven't been into it in a long while. I was surprised. [Deleted] is that right?

General RYAN. [Deleted]. We have the BMEWS, the 440L, which

is over the horizon.

Chairman STENNIS. [Deleted].

General RYAN. Yes, sir.

Secretary Seamans. You have over \$220 million in this budget for this purpose.

Chairman Stennis. You mean to [deleted].

Secretary SEAMANS. Yes. It is designed initially for [deleted] I believe, of mean time to failure. [Deleted].

Chairman Stennis. You will be operating that independently of any other agency of the Government?

Secretary SEAMANS. It will feed into our air to air-

General RYAN. National Military Command Center, NORAD Command Center at Cheyenne Mountain, and the Strategic Air Command Headquarters are the primary users of the warning information.

Chairman Stennis. It will be yours to operate as well as to use the

results.

Secreary Seamans. That is correct.

Chairman Stennis. Not tied in with anyone else.

Secretary SEAMANS. It will be used for national purposes.

Chairman STENNIS. NASA is not in on it? Secretary SEAMANS. No, they are not.

PREFERENCE OF CHEYENNE OR A-X

Chairman Stennis. I will move on now. I wanted to ask some more about this A-X. The Army hasn't been complaining, but I think they feel they have been neglected over the years, and I think you feel they feel that way too. We are probably going to have to choose between the Chevenne and the A-X. Maybe if the Chevenne had not run into trouble, it would have already had the field. But General, you said that they duplicate each other to a degree and they also complement each other to a degree. Which does the Army favor, just being frank about it? You understand these problems better

General Ryan. I have never specifically asked General Westmoreland. I can only draw my conclusions from discussions, but I would say that he probably would favor both, but if it came to a hard decision on this point, I can't speak for him.

Chairman Stennis. I expect you would wind up by getting more. I don't know to what extent you use the A-X. I know the Army feels that they have been neglected in these high priced missiles, and other items, and that they have been neglected in the past.

B-1 PROTOTYPE DEVELOPMENT

In talking about the B-1, you say, "We will not go ahead with production until after the prototype flies."

Of course that means that you are promising to hold up until the

prototype has successfully flown.

Secretary SEAMANS. In the F-15 on our initial procurement we asked the contractor to come in with hard figures or definite proposal for the first wing of F-15s in addition to all the R. & D. We did not feel in the case of the B-1 that we could do this. We felt that it is such a major step that it would be best to procure, to begin with, just the research and development, including five test aircraft, and that is all that will be included in the initial contract for the B-1.

Chairman STENNIS. That is all.

No procurement at all except these five prototype.

Secretary SEAMANS. That is right.

Chairman Stennis. And you are going to try to test those out and perfect them, and then give a contract?

Secretary SEAMANS. We felt that taking everything into account, that in the case of the B-1 this should be serial and that we should hold to a minimum the concurrency.

Chairman Stennis. How much time will that cost you?

Secretary SEAMANS. I think the first deployment of the aircraft is in 1978, that is the initial.

General Ryan. Operational capability.

Secretary SEAMANS. Right. I think if we had done these more concurrently it could have been perhaps 1 to 2 years earlier. This is costing us time, but as I say, this we felt was the best approach with this complex aircraft.

Chairman Stennis. I think that is correct. A lot of these errors and extra costs have been caused by this rush to production. Well, I

was encouraged by your decision on the B-1.

You emphasize that AWACS is a first priority in your air defense. That is what you really want, is it, General?

General Ryan. Yes, sir.

PROJECT PERSONNEL SELECTION

Chairman STENNIS. On page 20 you mention here down near the bottom of the page "We have not put enough emphasis on building up the capability of the project people in the field who have the direct responsibility."

What people are you talking about, military or civilian, or both? Secretary Seamans. We are really talking about both. Just as one example, General Bellis was carefully selected for the F-15 because of the job that he did with the SR-71. We felt that he could assume much greater responsibility for the F-15 than project people had originally, say, on the F-111. Then by picking somebody with this competence, we felt that in turn the people reporting to him could benefit from his experience, and they in turn would have more responsibility.

But in doing this we recognized that we cannot just dump a program, that we have got to keep following it, that there must be proper discipline reporting into headquarters in the Air Force, and in turn to OSD and the Congress, so we are not dropping them out of sight, but we are making sure that they do not get harassed and asked to do a lot of things that aren't important, that they are putting an

umbrella over them so they can get on with the job.

Chairman STENNIS. It makes sense to me the way you have handled this matter. For instance, you had those two prototype engines for the F-15. I don't believe there is any unusual hurry about these weapons. I just don't believe that we are going to catch fire tomorrow or that we are way behind although perhaps others are not very far behind us. I want to see you have the very best weapons that money can buy, but buy them with as little money as you can, and use more time.

Secretary Seamans. Mr. Chairman, I emphasized other areas where we are doing the same thing in addition to the engines. The radar for the F-15 is under a prototype development at both Hughes and Westinghouse, and we will have a fly off of that equipment. We are doing the same thing on the AWACS with the radar. Again it is Hughes and Westinghouse, to actually make our choice on the basis of actual hard information.

Chairman Stennis. I like that. I like it very much. Of course the F-14 was overdue, but I remember we made the decision right here at this table to take out the planes that the Department of Defense was recommending for that year and start the new one instead, and then they were back the next day just demanding enough. It looked to me like they wanted to go into production within that year, and gave a new set of reasons why they had to have it all at once. I understand now maybe they have been going too fast on it.

Again, I thoroughly enjoyed going through your statement, and

yours too, General. We have a few more questions here.

FREEDOM FIGHTER

What about this Freedom Fighter? I see you have \$30 million in here for it.

Secretary Seamans. Yes; we had \$28 million last year, I should say fiscal year 1970. We are requesting an additional \$30 million for 1971. We have gone out with our request for proposal asking for a plane that will be competitive with the MIG-21. We believe that such an airplane is important to the Koreans, the Chinese, the Thais, and the South Vietnamese. We are asking for quotes on [deleted] aircraft.

PREPARED QUESTIONS FROM SENATOR STENNIS

Chairman STENNIS. I will let that rest in peace for the time being. I hope that works out all right. Mr. Braswell, you make a note now on some of these things we have been talking about here and put a memorandum in as to the cost of some of those larger items, too, for my use later. We have some additional questions here, gentlemen, that I will submit for the record if I may, and send those answers in within a week if you can.

(Questions submitted by Senator Stennis. Answers supplied by the Department of the Air Force.)

Question. Normally, in times of cutback and retrenchment the argument is made that increased emphasis should be placed on research and development to maintain a strong technological base for future weaponry. Do you agree with this, and, if so, why aren't you proposing an increase if not a continued level for RDTLB?

Answer. I agree wholeheartedly with the thesis you have just stated. It is an investment in future capabilities to stress research and development in times of cutback and retrenchment. It provides a greater number of future options. However, the over-all mission of the Department of Defense is the security of the country at all times and some very hard decisions have had to be made. The constraints on our over-all budget, the immediate need to modernize a part of the force and the continued operation of the total force dictates that we accept less than we would like to see devoted to research and development. Whereas, we had originally forecast a need for \$4.7 billion in July 1969 for FY 1971, budget constraints and actual needs force us to the present level of \$2,909.7 million, which I agree is our appropriate share of an austere DOD budget.

Question. Will you comment on the use of constant dollars in formulating your estimates for research and development and procurement of your major weapons systems? Was this done uniformly and does your FY 1971 estimate reflect anticipated inflation?

Answer. Bureau of the Budget guidance for developing the Air Force Budget Request, has been "it will be assumed that on the average the general level of prices will be the same during the budget year as at the time the estimates are prepared". Historically, the inflationary trend has had an impact on budget

estimates. Cost growth has resulted. The Air Force is anxious to establish credibility in estimates for the ultimate cost to be paid for major items of R&D and Production. We still must resolve problems such as the lack of agreement among experts on the extent of inflation within different industries and the rate of

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projecting future inflation.

As a general rule, the FY 1971 Budget reflects 1970 dollars for the budget and out year estimates consistent with BOB guidance. It must be recognized that, although it cannot be separately identified, there could be some economic escalation included in the instances where estimates are based upon contractor data. As long as the current inflationary trend continues to be a significant factor in "cost growth", resultant changes to cost estimates from year-to-year should be expected. We badly need a better system to identify costs attributable to inflation to insure that these costs are properly recognized and are treated uniformly.

Question. Your estimate for the B-1 is \$100 million for FY 1971, the same as FY 1970. Are these amounts consistent with contractors' proposals, the last of which you state was received on February 16, 1970?

Answer. Mr. Chairman, I would like to expand and clarify my statement concerning the receipt of the last contractor proposals on February 16, 1970. As you know, we issued Request for Proposals (RFPs) for the engineering development of the B-1 to airframe and engine manufacturers on November 3, 1969. We require submission of their proposals in several packages at various times during the source selection process. For example, the system contractors' cost and management proposals were submitted on February 9, 1970. Performance trade-off data was received on February 16, 1970, and represented the last input of the technical portion of the system contractor proposals in response to the RFPs. This is a significant milestone and is the one I referred to in my prepared statement. Engine technical data was also submitted in February and engine cost proposals are due later this month.

We have \$100.2M approved for FY 1970, and the budget contains \$100M for FY 1971. We are currently planning to award contracts during May, and therefore, will have \$200.2M for about the first 13 months of the B-1 engineering development program. The Air Force requested \$196M for FY 1971, however, because of budget limitations, this was subsequently reduced to \$100M. We estimated (without the benefit of firm contractor proposals) the impact on the FY 1971 reduction is to increase total RDT&E costs by about \$100M with an approximate six months slip in first flight. Assuming that out year funding is provided as currently planned, the \$100M in the FY 1971 budget would now permit a first flight by about June 1974, that is, about 48 months after contract award for engineering development as opposed to the originally planned 42 months.

Prior to validation of the airframe contractors' cost proposals (and receipt of the engine contractors' cost proposals), we directed the airframe contractors to submit revised cost and schedule proposals based on the availability of \$200.2M for FY 1970 and 1971. Revised system contractor cost and schedule proposal submissions based on a funding limitation are now due by March 27, 1970. It may also be necessary to require the engine contractors to revise their cost proposals based on an assessment of the system contractors' revised cost and schedule proposal. Evaluation of the system and engine proposals will not be completed until the first part of May at which time we will be able to assess further the impact of the funding restrictions outlined above on the schedule and out year funding requirements for the engineering development program.

Question. Deputy Secretary Packard on 22 January 1970 requested the Air Force and Army to develop a position paper within 30 days on the A-X and Cheyenne helicopter which would address their relationship in a close air support role.

What is the Air Force position?

Answer. I believe that we need an immediate go-ahead on the A-X, a specialized close air support aircraft, to fill an urgent operational requirement. However, I do not support procurement of the Cheyenne for the following reasons: It duplicates existing and programed Air Force capabilities for close air support—a mission assigned to the Air Force; even if its technical problems can be solved, it is of questionable utility in a moderate to high threat environment; and, finally, its costs are soaring—recent Army estimates indicate that its unit price may exceed \$2.5 million. As regards an Advanced Aerial Fire Support System, called AAFSS—a VTOL aircraft for close air support—we support research and de-

velopment at least through the prototype stage. Our own interest in VTOL aircraft is well known. When technology can provide an AAFSS-type aircraft with the necessary operational capabilities, I believe that the Air Forve may want some of its own force.

Question. When you state that your objective for the A-X is a truly simple, inexpensive airplane, what estimated unit cost do you have in mind?

Ansicer. The unit cost of the A-X will vary, of course, with the number of airplanes that we ultimately procure but we are estimating the unit recurring flyaway cost of the A-X at about [deleted] for a buy of [deleted] aircraft. The unit production cost, to include flyaway, initial spares and peculiar support, is estimated at [deleted]M for this number of aircraft. Total research and development costs are estimated at about \$194M. So, if some [deleted] aircraft are procured the total unit cost for development and acquisition would be some [deleted]M (in 1970 dollars).

Question. Since I understand that your estimate docsn't include the sophisticated avionics to make this a night and all weather aircraft, would this add another \$1 million per plane to your estimate? Is this then a simple, inexpensive airplane?

Answer. The basic single place airplane that we are proposing is a simple relatively inexpensive airplane. It has a basic avionics package that will provide a capability to accomplish the great majority of the close air support mission under visual conditions, day or night. We plan to make a number of the early production airplanes as two place versions, install potential avionics systems for increased night/adverse weather capability, and test them for accuracy, reliability, and operational suitability before committing ourselves to a production decision. Many of these sensor and weapon delivery systems are very expensive and could easily double the cost of the airplane. After they have been proven in a flight test program in the A-X we may equip a portion, but only a portion of the force, with these systems.

Question. You state that you are currently examining all of the various means for increasing MINUTEMAN survivability. Does this examination also include the cost of deploying additional MINUTEMAN IIIs beyond the [deleted] projected for your 1975 force objective as an alternative to mobile, fixed, hardened or defended sites?

Answer. The main objective of the MINUTEMAN Rebasing program is to evaluate means of enhancing pre-launch survivability of the programed MINUTEMAN force without additional missile deployments. However, the data also provide the basis for evaluation of survivability of the forces with increased deployments of MINUTEMAN missiles.

Question. Will these studies (MM Rebasing) include consideration of the initiation of Phase II of SAFEGUARD as proposed by the President?

Answer. Yes, the studies do take into account the effect of SAFEGUARD Phase II on the survivability of MINUTEMAN.

Question. During the R&D Subcommittee review of the A-X program, we were sooised that the Air Force considers this program of such importance that it would accommodate these aircraft within the 23-wing tactical fighter force. Do you agree with this?

Answer. Yes. The Air Force has an urgent requirement for a new specialized Close Air Support aircraft to support highly mobile ground forces and, therefore I consider that the A-X is needed in our tactical fighter/attack force structure. However, our force planning has not specifically addressed the force mix or number of A-X wings which we might have in a fiscally constrained or arbitrarily limited level of 23 fighter wings. This will depend on the exact number of dollars available.

The tactical force structure proposed by the Air Force in its FY 1971 Budget Submission and as reflected in the Defense five year force projection included the first A-X squadron within the 23 wing force in FY [deleted], while continuing to build to a level of [deleted] wings by FY 1978. The [deleted] wing force contains [deleted] A-X wings and is based upon meeting tactical force requirements within reasonable fiscal planning levels. One major advantage of the A-X is that, because of its estimated low cost, it may give a well-sized force, even within tight fiscal constraints.

In this manner, the A-X will replace aging and attriting systems currently in the tactical force, as well as release other aircraft from the active force for modernization of the reserve forces. Additionally, we plan to equip ANG squadrons with the A-X directly from new production deliveries in order to replace their older tactical aircraft and to provide greatly improved Close Air Support capability for the reserve ground forces.

Question. In the recent base closure announcement, was any consideration given to the turning the Eastern Test Range over to NASA and closing down Patrick Air Force Base, Florida?

Answer. No, sir; but we are re-sizing and reducing the range to support a defined DOD basic workload, as a part of the recent Air Force-wide personnel reductions.

Question. Section 403 of the FY 1970 Military Procurement Authorization Act provided that payments for Independent Research and Development. Bid and Proposal and other technical effort would be limited to 93 percent of the total amounts planned for these purposes. Although our Ad Hoc subcommittee on Research and Development is holding separate hearings on this subect and will have Dr. Foster appear as a witness, each of the services should have an opportunity to comment since it impacts largely on their procurement appropriations. Would you answer the following questions? What have you done to implement Section 403?

Answer. Secretary Laird has put into the record Defense Procurement Circular No. 75, dated 10 December 1969, which carries out the instructions of Section 403. As he indicated, we have had problems in administering this amendment. We find that it is almost impossible to isolate FY 1970 overhead funds used for IR&D, B&P and OTE on contracts funded from several years appropriations. The Air Force is carrying out the intent of Section 403 and DPC 75 to the best of our ability.

Question. Have you had an opportunity to review the GAO report and, if so, would you care to comment on it?

Answer. I have not personally reviewed the GAO report and therefore do not wish to comment on it at this time. Dr. Foster has responded to the draft report and we supported his reply at that time. My staff is presently reviewing the latest version of the report.

Question. Do you believe that a separate line item is the answer to meaningful control? If not, how would you control the level of costs?

Answer. I believe the IR&D and B&P costs should not be made a line item in the budget. Such an approach would be impossible to administer. There is no way to allocate a fixed dollar figure effectively among the numerous and various size contractors and their subcontractors with whom we do business. There is also no feasible method to establish an amount in the budget for such a line item. I also believe that the type of fiscal and technical review and controls that will best satisfy the concerns of Congress can be achieved within the existing framework. Secretary Packard recently approved a new DOD policy on the management and control of IR&D and B&P. Doctor Foster presented this policy to Senator McIntyre on 13 March 1970. I support his new management approach and believe it will be effective.

Question. Would the alternative of advance agreements, coupled with dollar ceilings, cost sharing, and technical reviews, be effective in controlling costs and insuring that the contractors' efforts for which the government would pay would be either directly or indirectly related to a DOD function or operation?

Answer. We now negotiate advance agreements with most of our major contractors and plan to extend their use to all of our major contractors, about 100 of them, under the new DOD pollcy. We also plan to strengthen the technical review process. We firmly believe that this is an effective means of controlling the overhead costs involved while retaining the "I" in IR&D. We also firmly believe that the contractor efforts for which the government pays its share are, or will be, directly or indirectly related to a DOD future requirement.

Question. Do you have any other suggestions?

Answer. The Air Force has worked closely with the DOD and we support the statements made by Dr. Foster to the House Armed Services Committee on 2 March 1970 and which he made to Senator McIntyre on 13 March 1970. I am sure that these improvements can be made within the existing framework.

Question. Will you provide your best estimate of how much your service will spend on IR4D, B&P and OTE during FY 1970 and 1971?

Answer. While it is difficult for us to estimate overhead costs of our contractors with any high degree of confidence, we have prepared an estimate of Air Force costs for IR&D, B&P and OTE. I believe that this estimate will eventually turn out to be on the high side when the final audits are made several years from now. We estimate that the total costs will be in the neighborhood of \$325 million for FY 1969; \$265 million for FY 1970, and \$250 million for FY 1971.

Question. Mr. Secretary, with respect to the pending procurement request would you indicate any change in terms of dollars in this year's request which has been caused by the switch from 2½ war strategy to the 1½ war strategy? The Chair might add the Army has already indicated that this change had no effect on the budyet since the 2½ war strategy has never been funded.

Answer. The Air Force procurement request has not been influenced by the switch from a 2½ to a 1½ war strategy. The previous strategy called for much higher procurement levels than were ever funded. Our present procurement request is related to the need to replace attrition losses incurred in the Vietnam conflict and to proceed with long overdue and vitally needed modernization of the currently approved USAF tactical forces.

Question. What are the present plans for the post-Vietnam size and configuration of the Air Force? The Chair would note that there is some discussion that the Army will go down to about [deleted] divisions.

Answer. With regard to our Strategic Forces, we believe that at least [deleted] B-52C/F squadrons, [deleted] B-52G/H squadrons and 4 FB-111 squadrons should be maintained post-Vietnam and our current planning reflects this goal.

In regard to our General Purpose Forces, the Air Force believes that at least 23 active wings should be maintained post-Vietnam and our current planning efforts are directed toward this goal. However, in recognition of fiscal constraints, we are planning several other reductions. For example, we plan to reduce from [deleted] active tactical reconnaissance squadrons; from [deleted] Special Operations Force (SOF) aircraft; from [deleted] Tactical Electronic Warfare Support (TEWS) aircraft; and from [deleted] Tactical Air Control System (TACS) aircraft.

Question. Would you indicate to what extent the Air Force program for this year is to support Victnam operations and to what extent other operations.

Answer. The amount in the Air Force program for FY 1971 for incremental Southeast Asia cost is [deleted] billion, or [deleted] of the total obligational authority of \$22.7 billion request. The amount for all other operations is [deleted] billion.

Question. Will the programs supported in this current request go beyond the post-Vietnam plans for the Air Force in terms of weapons systems?

Answer. Yes, Senator, as discussed earlier, this current request covers the plans for the post-Vietnam Air Force weapons systems.

Question. To what extent does the present Air Force request meet our overseas commitments and treaty obligations?

Answer. This request will permit the Air Force to meet its overseas commitments and treaty obligations with these limitations. [Deleted.]

Question. Would you break down the Air Force program in terms of your strategic and general purpose forces?

Answer. The following table summarizes the FY 1971 Air Force strategic and general purpose forces program.

Summary of USAF major force program data Fiscal year 1971 Program (WG/SQ) Strategic offensive forces: Bomber _____ Reconnaissance _____ Tanker _____ Strategio defensive forces: Interceptor _____ Missile _____ General purpose forces: [Deleted, 1 Fighter _____ Other Fighter and Attack_____ Reconnaissance _____ Special Operations Force_____ Tactical Airlift Defense Comm. Planning GP: Acft _____ Msle _____ Aeromed airlift______

Question. In your opinion, are the funds requested in this program sufficient to meet the mission of the Air Force for the forthcoming fiscal year?

Answer. The funds requested in this program are not sufficient to meet the mission of the Air Force for the forthcoming fiscal year without incurring some degree of risk in our ability to maintain the security of the United States.

The Air Force requested \$24.6 Billion in FY 1971 TOA and OSD approved

\$22.7 Billion or a reduction of \$1.8 Billion.

Due to the reduction in our budget request for FY 1971 we have cut back the B-1 R&D program by \$96 million, almost in half, which will delay the first flight. We have reduced procurement of the MINUTEMAN III which slows the

deployment rate to modernize the MINUTEMAN force.

Our Aerospace Defensive Forces have been heavily impacted in previous years. In the six years prior to FY 70 our interceptor force was reduced 44% and in FY 1970 we made an additional 24% reduction. This year funds to develop an improved interceptor were cut from \$17.5 million to \$2.5 million which further delays force modernization. We will further reduce our CONUS surveillance forces in FY 1971 by phasing out 17 Gap Filler radars and 10 Long Range Search Radars.

In our Tactical Forces in FY 1971 we will reduce procurement of the A-7, F-4 and F-111 for a total of 151 aircraft which delays needed modernization of

our fighter/attack forces.

In our Airlift Forces the FY 1971 funding levels have required a cutback in development of a transport aircraft to satisfy the short field requirement. The approved C-5A funding has reduced our programed strategic airlift capability

by 16% and our outsize cargo capability by 27%.

The Air Force R&D program has been curtailed to the point where development effort on our highest priority programs requires that systems sophistication be degraded below the capabilities which could be attained to satisfy future objectives. With recent budget constraints the Air Force technology base is weakened as productivity erodes due to inflationary trends in a fixed dollar program.

Taken by individual programs the implications of reduced funding in FY 1971 is difficult to assess, at least for the near term. However, collectively the austere Air Force budget raises questions about the future which I feel imposes increased risks and decreased options for the National Command Authorities. Considering the growing Soviet threat, which is balanced across the spectrum of warfare and supported by a vigorous R&D effort, we cannot be assured that our forces are sufficient to deter and if deterrence fails that they are adequate to respond. In those areas where I have indicated a delay in force modernization we face the risk of ineffectiveness due to obsolescence. Worldwide reductions in Air Force support as a result of reduced funds in FY 1971 means we must reduce creature comforts with impacts on morale, retention, enlistment and attainment of a volunteer force.

Question. Last week the newspapers showed a picture of the grounded F-111 sireraft. How long will the inspection of the wing pivot and static proof test require?

Answer. The first operational aircraft are scheduled to complete the inspection and static proof test program in June 1970. We expect a large number of the aircraft will be flying by the end of the calendar year, and they should all be back in service by around May 1971.

Question. If further inspection is required as a result of the concurrent review of manufacturing processes, what might this entail if additional problems are encountered?

Answer. You have identified an important reason for the proof test program because it will allow us to assess the impact of any irregularities found in the manufacturing processes. Structural components from vendors with inadequate inspection techniques and/or procedures will be suspect and treated accordingly. In some instances it may be necessary to replace certain parts. This would be considered probably the worst type problem because it is the most expensive and time consuming.

Question. How much will it cost to acquire and install the new box in the earlier aircraft?

Ansicer. The cost to acquire and install the new safe-life steel wing carry-through box in F-111 aircraft by retrofit is currently estimated to be \$123,000 per aircraft. It is important to add that this may not be necessary as soon as heretofore thought. Indications from on-going fatigue tests are that the safe operating life of the current wing box as modified may be significantly longer than we expected.

Question. What effect will these technical problems have on the FB-111 SRAM modification request?

Answer. Mr. Chairman, the Modification request for the FB-111 SRAM program will not be adversely affected by the current technical problems associated with the F-111. The Recovery Plan (proof testing) and new aircraft deliveries will be accomplished in time to coincide with current SRAM modification kit procurement and installation schedules. Modification funds are still required as listed.

Question. T-X Navigational Trainer. Last year the Committee deleted the T-X and recommended a review to determine if a less expensive method was available to satisfy the navigational training requirement.

Answer. Yes sir, a review was conducted to consider possible alternatives.

Question. What alternatives did you consider and why were they rejected?

Answer. We considered both smaller and larger aircraft, and whether aircraft replacement is required or not.

Planned economies in the undergraduate Navigator Trainer System are based on a mix of jet airborne instruction and simulator training. Experience necessary for qualification as a navigator cannot be realized through the use of simulators alone. To be effective, however, instruction and experience provided in the air must be compatible with instruction on the simulators, which incorporate equipment and procedures standard on today's operational aircraft.

One of the shortcomings of the presently employed, propeller-driven T-29s is that they are equipped with basic navigation aids of yesteryear which are not standard equipment on currently operational jet aircraft. This outmoded navigation equipment, coupled with the T-29's inferior performance, necessitates extensive combat crew training following undergraduate navigator training. Replacement by modern jet navigator training aircraft will enable significant reductions in the amount of combat crew training required, thus effecting substantial cost savings. As possible replacements, we have examined the DC-9 and Boeing 737, which are the preferred candidates, the BAC-111, Gulfstream II, Fairchild-Hiller 228, C-5, C-141, C/KC-135, T-39, C-140 and Lear Jet.

With the exception of the BAC-111, which was ruled out as a foreign procurement, cost effectiveness was used as the main criterion for selecting among these alternatives. The training capacity of the Grumman Gulfstream II and Fairchild 228 would be 8 students and 2 instructors. This smaller capacity increases the number of aircraft, the total number of rated pilots and instructors,

and the number of maintenance and support personnel required, thus increasing significantly the overall operating costs of the system. In order to provide each student with adequate training time in a "lead-navigator" role, use of the much larger C-5, C-141, and C/KC-135 aircraft would be uneconomical. The C/KC-135 in particular, due to its age and original intended usage, would require extensive and costly structural modification as well as systems modification to perform this mission. The T-39, C-140, and Lear Jet-size precludes installation of some of the required equipment and they are too small and limited in endurance to be economical. The crew and maintenance costs for the large number of aircraft required make this the least cost effective group of candidates.

Question. What kind of basic airframes will you use!

Answer. We will use an existing FAA certified medium jet aircraft of the Boeing 737 or McDonnell Douglas DC-9 type. Both of these aircraft are in commercial production and will be available during the time frame. They are fully certified by the FAA and approach very closely all of the stated operational requirements for the UNT system. The projected student load can be adequately accommodated on these aircraft without significant excess space and allows a configuration which matches the desired student/instructor ratio while providing each student an adequate proportion of their training in the lead navigator role. This category of aircraft is the most effective from a training and cost standpoint.

Question. Aircraft for South Vietnam. Would you provide a breakout of the aircraft, number and cost, being acquired in 1968, 1969 and 1970 for other countries? Spares? Other equipment?

Answer.

AIRCRAFT FUNDING SUMMARY—SUPPORT OF OTHER NATIONS

[Amounts in millions]

	Vietnam		Laos		Thailand	
	Quantity	Amount	Quantity	Amount	Quantity	Amoun
iscal year 1971:						
F/RF-5A/B						
T-37C						
T-41D						
UH-1H						
U-17B						
Modifications						
Common AGE						
Spares and Repair Parts:						
Initial						
Replenishment						
Total						
iscal year 1970:						
F/RF-5A/B						
T-41D						
UH-1H	10					
Modifications	(Deleted.)					
Common AGE						
Spares and Repair Parts:						
Initial Replenishment						
Replenishment						
Total						
iscal year 1969:						
F/RF-5A/B						
A-37B						
T-37C						
UH-1H						
U-17B						
Common AGE						
Spares and Repair Parts:						
Initial.						
Replenishment						
Total						

Question. Would you provide a breakout of aircraft losses for Southeast Axia, and all other losses for 1968, 1969, and 1970?

Answer. Total world-wide USAF aircraft losses, including helicopters, are as follows:

	1968	1969	January- February 1970
Southeast Asia: Hostile Operational	304 87	217 77	22 11
Total	391 (deleted)	294 [deleted]	33 [deleted]

PREPARED QUESTIONS FROM SENATOR THURMOND

(Questions submitted by Senator Thurmond. The answers supplied by the Department of the Air Force.)

Question. Can you give us some ballpark figures on development and program costs for the proposed B-1 strategic bomber?

Answer. Senator, as you know, our cost estimates are projections based on the use of historical data from past and current programs. The cost estimates do not include inflation factors for future years, and were made without the benefit of firm contractor proposals. For these reasons, as you have recognized, there is significant uncertainty associated with the cost estimates. Nevertheless, our current estimate, based on 1970 dollars, is about \$2.3 billion for RDT&E and includes prior year funding for advanced development and preliminary system design studies. Although a production option is not part of the current program, we have estimated that for a buy of [deleted] aircraft, the production cost would be about \$7.0 billion and the 10 year operating cost would be on the order of \$3.7 billion. These estimated program expenditures would occur over a period of about 18 years.

Question. What lessons learned from the C-5A and F-111 programs would apply to the B-1 bomber program?

Answer. Senator, as you have implied, there are lessons to be learned from the C-5A and F-111 programs. We have learned, for example, that the total Package Procurement Concept can have many pitfalls and has proven to be an inflexible approach to major weapon system procurement. It is for this reason that the B-1 engineering development contracts will be cost plus incentive fee type instruments in which changes, subject to mutual accord, can be made on a government controlled basis without cumbersome re-negotiations. However, changes will be approved only after they have been critically examined by the Air Force for their cost savings and/or cost effectiveness. Further, we are not requesting the contractors to commit to production prices that may not materialize for 7 or 8 years.

The C-5A and F-111 programs have also shown a pressing need for improving the management and cost control of new programs. We will depend upon two principal management tools for control of costs. These are management engagement with emphasis on costs and program control based on the demonstration of sequential technical milestones. We plan to subordinate engineering management as normally exercised and concentrate on a combined management/engineering approach with emphasis on cost control. As the inherent performance of an air vehicle is largely established early in the design cycle, the review of critical technical milestones in this early phase will insure the greatest inherent performance. Any large expenditure of dollars to meet required performance will be thoroughly evaluated before the contractor is given approval to proceed. Further, any proposed changes will require documented cost and schedule impacts as well as complete technical justification. Continuing management reviews will be conducted to assure the submittal and credibility of all necessary information. We also propose to control the release of funds to contractors commensurate with the attainment of technical performance milestones. The purpose of this control

is to avoid spending large sums of money to meet a given program plan when a slippage in key milestones makes it impractical from an economic standpoint.

In addition, as you know, we have recently experienced structural problems on both the C-5A and F-111 programs. We are currently investigating and actively pursuing solutions to these problems. I can assure you that on the B-1 program we will take full advantage of the knowledge gained from the structural problems encountered on these programs.

Question. How much has the Air Force spent to date in planning for the B-1 bomber program?

Answer. About \$140 million has been spent competitively during the past four years for preliminary system design studies and avionics and propulsion advanced developments to illuminate and reduce the technical risk associated with the development of the B-1. Specifically, there have been seven avionics advanced development tasks initiated. These tasks have either been completed or are now in various stages of test. Avionics advanced developments and avionics subsystem studies have cost about \$44 million. In the propulsion area, a total of about \$72 million has been expended for the design, fabrication and test of advanced propulsion components and construction of demonstrator engines. These engines closely approximate the size and cycle envisioned for the B-1. To date, several hundred hours of running time have been accumulated on these demonstrator engines. The remainder of our funds, about \$24 million, has been devoted to system design studies. The results of the avionics and propulsion efforts and system design studies have given us high confidence that the risk for engineering development of the B-1 has been reduced to a minimum.

Question. Does the Air Force plan to test some of our old MINUTEMAN which have now been on site location for a number of years?

Answer. This has been done and is continuing to be done. Our Minuteman force is tested both by full range launches and by ground surveillance programs. Flight test launches use missiles that are randomly selected from those deployed in the operational force. Through this sampling procedure, the ages of missiles used in flight tests have ranged between a few months up to [deleted] months. Ground static firings are conducted as a part of the propulsion surveillance program to determine aging characteristics of each of the 3 stages. Motors up to [deleted] months of age have been fired in this static test program without problem. The current estimated service life of our earliest Minuteman missiles is [deleted] months.

Question. Do you feel it is safe for us to allow our ICBM force to fall behind the Soviets?

Answer. It is decidedly unsafe for this nation to permit Soviet ICBM superiority. The most dangerous threat to the United States is the strategic nuclear force of the Soviet Union which continues to develop at a rapid pace.

The primary objectives of Soviet strategic policy have been to build a more formidable deterrent and to overcome the U.S. lead in capabilities for intercontinental attack. As the main element of their strategic offensive nuclear forces, the Soviet ICBM force is projected for the seventies to increase from [deleted] with the most likely Soviet goal to be between [deleted] ICBM launchers. Furthermore, assuming no arms limitations agreement to the contrary, the Soviets will probably deploy MIRV. Although there is not an active test program for the type of reentry vehicles considered essential for very high accuracy, we estimate that the circular error probable (CEP) of the Soviet SS-9 to be [deleted] nautical mile. It should be expected that further improvements to their guidance systems alone could allow a CEP of about [deleted] nm for the SS-9 by 1971.

The Soviet achievements in ICBM technology and launcher development steadily overshadow our numerically static ICBM force. Furthermore, as the USSR ICBM force grows so does their capability to launch a devastating first strike against U.S. forces [deleted]. The Soviet nuclear threat to the United States is so serious in its potential consequences, that it must receive primary consideration. Accordingly, the Air Force views any strategic ICBM imbalance in the Soviet favor as an inherently unsafe situation.

As a part of the U.S. strategic offensive TRIAD, in an era of budgetary constraints, we have had to sacrifice ICBM numerical superiority for qualitative improvements to our forces. In addition, the MINUTEMAN rebasing effort must be diligently pursued in order to:

a. Strengthen U.S. deterrent credibility.

b. Increase the ICBM prelaunch survivability.

ability. Digitized by Google

The strategic offensive TRIAD of ICBMs, strategic bombers, and submarine launched ballistic missile forces has, thus far, accomplished the fundamental mission of deterrence of nuclear war. As indicated in the formal statement to the Committee, if the Soviets achieve strategic nuclear superiority, and we fail to maintain adequate forces, our ability to deter aggression would be seriously jeopardized. The Soviet's improved strategic posture will probably incline them toward a more aggressive course in situations that offer them an apparent local advantage. They may, for example, commit their resources even further in support of aggressions by proxies. They might also be more willing to use military force in areas distant from the Soviet borders when circumstances do not indicate a high risk of direct confrontation with the U.S. More importantly, they could arrive at an assessment that the risk of such a confrontation is greatly lessened. As a minimum, the change in strategic relationships will provide stronger support for a more aggressive pursuit of their global objectives.

Onestion. How much do you feel the accuracy of our MINUTEMAN will offset the approaching numerical superiority of the Russians?

Answer. Damage expectancy against any target system, be it urban industrial or military, is dependent upon both accuracy and weapon yield. Accuracy must therefore be examined in relation to weapon yield and total numbers of reentry vehicles. If we credit the Soviets with accuracies comparable to those of the MINUTEMAN the balance of missile superiority rests upon weapon yield and total numbers; areas which the Soviets are stressing in their strategic programs.

The Air Force is constantly striving to increase accuracy and to develop tactics to increase the effectiveness of the Minuteman force. Also, the MINUTEMAN should not be considered in isolation as an offset to Soviet numerical superiority; the strategic bomber force and the sea based missiles bolster our offensive power by a significant degree.

Question. How do the U.S. and Russia compare regarding deliverable megatonnage?

Ansicer. I know of no method to quantify such a comparison precisely. Our evidence on Soviet underground nuclear tests does not permit us to judge with great precision all advancements they have made in nuclear weapon development. Much of our analysis is based on US weapon design performance and our knowledge that the Soviets are capable of similar performance. Further, our up-load options, as well as those of the Soviets, cover a range of contingencies and targetting variables that would be war-scenario dependent.

If we assume US forces continue to develop approximately as now envisioned and Soviet forces results in those projected by the intelligence community, our relative positions are shown in the chart below. The US will retain its lead in deliverable weapons. However, because of the larger warheads estimated to be available to the Soviets, we have already lost our lead in deliverable megatons and will fall behind in one-megaton equivalents in the next few years. The "one-megaton equivalent" are a rough measure of the fatality producing potential of all weapons, regardless of their size.

While the chart should not convey an impression of intelligence precision we do not possess. I believe that basic trends it reflect are valid.

REPRESENTATIVE UNITED STATES AND U.S.S.R. NUCLEAR LOADINGS FOR INTERCONTINENTAL ATTACK! (MIDYEAR)

19	1965		1970		1971		1974 2	
United States	U.S.S.R.	United States	U.S.S.R.	United States	U.S.S.R.	United States	U.S.S.R.	
Weapons 3								

I U.S. calculations derived from table III, "5-Year Defense Plan" (FYDP) as revised Feb. 24, 1970. Approximately equivalent Soviet forces derived from high side of the range of force inventories in national intelligence projections. Both sides include total force loadings of bombs and air-to-surface missiles on active bombers, on-line operational, and research and development and training (CBM launchers and on-line nuclear powerd SLBM launchers.

The latest "FYDP" does not provide U.S. nuclear un-loads beyond fiscal year 1971. Acculations beyond fiscal year 1971 are to be determined during the fiscal year 1972-76 program review cycle. The U.S. 1974 figures are based on OSD (SA) "Force Fit-up" analysis, October 1969 and are included to show an approximate trend with projections of Soviet force development.

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force development.

² Weapons for initial strikes only. No war game degradations applied.
• Weapons effects based on representative yields of available warhead mixes. Higher and lower results are possible.

Question. General Ryan, what do you consider our present greatest weakness in the strategic area and what do you see as our weakest point in the year ahead?

Answer. We believe that Soviet Force improvements have reached the point that U.S. force survivability improvements are required and that the lack of appropriate near-term survivability measures will constitute our greatest weakness in the coming year. We are moving ahead with our Satellite Basing program to improve the survivability of our manned bombers and their supporting tanker aircraft. We are taking steps to improve the ability of our MINUTEMAN missiles to survive launching in a nuclear environment. We are making improvements in our warning systems and command and control capabilities. Despite these improvements, we believe that additional near-term measures are required. These include expansion of our Satellite Basing program, additional improvements to our warning and surveillance systems, and further protective measures for the MINUTEMAN force.

Question. Why are your A-X development costs so high when you say this plane will be cheap in cost and will use considerable off-the-shelf technology?

Answer. Although the A-X is a relatively simple aircraft from a design standpoint there are still basic design requirements that must be met and engineering costs in industry have increased dramatically in the last 20 years. A large portion of the costs are attributed to the test program and to the design of basic tooling. The A-X costs have been re-examined in great detail and are considered as valid as can be obtained at this time. The engines have been operated at the required

level, and no technological breakthroughs are required.

When compared to other R&D programs, the A-X development costs are considered minimal because the A-X does not require exotic materials or technological breakthroughs. Last year we were estimating the RDT&E costs for the normal Contract Definition approach to development at about \$137M. This was later reduced to about \$130M as a result of our Supplemental Studies. On that basis, however, the competitive prototype approach to development involved an increase to about \$169M, primarily because two contractors must be funded through the competitive fly-off phase. Recently the decision was made to shift the funding of the first seven production aircraft, initially used in the test program, from production funding to RDT&E. This caused an increase of about \$25M in the RDT&E or about \$194M total for the competitive prototype program.

Ouestion. How well will the A-7 fill the Air Force close support role?

Answer. The A-7D should prove to be an excellent close air support aircraft which will provide a significant increase in our ability to perform this mission. It will replace F-100s, A-1s and A-37s, and have approximately twice the range or loiter time as the F-4 while carrying a 25 percent greater bombload. Thus, the A-7D will give the Air Force much needed modernization and a substantial boost in capability-both in close air support and in the tactical interdiction mission.

Although the A-7 is not a supersonic aircraft, this limitation is not particularly relevant to the close air support task. The A-7D will have much improved accuracy, maneuverability and survivability-prime considerations in the close

air support role.

Looking to the future, the A-X, which is being designed specifically for the close air support role will be more cost effective and more capable. The A-X will complement and augment the A-7D. Because of its relatively low cost, we can proure the A-X in quantities more nearly meeting our requirements. The AX IOC is FY [deleted] while the A-7D is in final Phase III testing at this time. Only three wings of A-7s are programmed for the force, one in FY 71, two in FY 72 and three by end FY 73. This will be followed by the introduction of the first A-X squadron in FY [deleted].

Oucstion, When will you complete your A-7 buy?

Answer. Under the curently planned procurement to support three wings a FY 72 procurement of 97 aircraft will complete the A-7D buy. These aircraft will be delivered through calendar year [deleted].

Question. Do you feel the South Vietnamese have the technical background to keep an Air Force in operation?

Ansicer. I certainly do. The VNAF currently operates and maintains a 21-squadron force in an effective way and, using USAF measures of performance, all VNAF squadrons are operationally ready and are achieving a very creditable combat effectiveness. I also feel that our extensive training programs, which are greatly expanded from those of previous years, will provide them sufficient technical competence to independently operate and maintain their future forces with decreasing dependence on U.S. or contractor assistance.

Question. Do you think we will have to have sizable numbers of U.S. Air Force personnel in South Vietnam so long as they have an Air Force?

Answer. No, Senator, plans are to reduce Air Force personnel there to modest size advisory level. Just how long USAF personnel will be necessary is dependent on many variables and difficult to determine at this time.

Question. Has the Air Force done a development concept paper on the Freedom Fighter? Do you plan one?

Answer. Yes, the Air Force has, in conjunction with the Office of the Director of Defense, Research and Engineering, completed a development concept paper (DCP) on the International Fighter Aircraft (IFA). This DCP was approved by Deputy Secretary Packard on 20 February 1970 following a review of the program by the Defense Systems Acquisition Review Council (DSARC). This DCP will be revised to include subsequent decisions and this program will be reviewed again by the DSARC following source selection but prior to contract award.

Question. Secretary Seamans, what has been the unit cost of the C-5A to date and what will it be through the 81 plane buy?

Answer. The average unit cost of the 81 aircraft buy is about \$53 million based on total program costs. This includes R&D, procurement, initial spares, military construction, and the \$400 million, i.e., \$200 million in FY 1971 and \$200 million in FY 1972 reserve for contingencies.

The comparable unit cost to date is somewhat higher than the \$53 million because Lockheed is still moving down from the high side of the learning curve i.e.. Air Force has accepted 12 out of the 81 aircraft program.

Question. Is it not true also that the F-111 has not been flying at stress rates, but rather just circling around and staying away from flying anywhere near the capacity for which it was designed?

Answer. The F-111 has been flying with reduced operational limits. It. like all other new aircraft, has been restricted to 80% G. loads until ground and flight tests verify structural design. However, this limitation has not prevented the F-111 from demonstrating numerous unique capabilities. More than 52,000 hours of flying have been logged in F-111 aircraft. The aircraft has been flown at sustained speeds of 1.2 Mach at sea level and 2.2 Mach at altitudes near 60,000 feet. It has flown below 1,000 feet at night and in weather over some of the most rugged terrain in the world. Outstanding accuracies have been achieved in conventional dive bomb, rocket, and strafe patterns. The F-111 has been subjected to hostile fire while demonstrating an unequaled radar bombing capability in combat over North Vietnam. I do not regard these accomplishments as "just circling around."

Fatigue tests revealed deficiencies in the wing carry-through structure which resulted in temporary load restrictions being placed on F-111 aircraft. Fixes to correct these deficiencies have been identified, tested, and are being incorporated into all F-111's, after which the aircraft will again be cleared to 80% (5.86 G.) load limits. Until the recent grounding of the fleet, as a result of totally different causes, approximately 50 F-111As had been so cleared.

Question. Dr. Scamans, what is the per plane cost to fix the wing crack in the C-5A?

Answer. It is estimated that development, design, production, and installation of the wing fix will cost between \$10 and \$15 million, or an average of \$123,000 to \$185,000 per airplane. Included in the \$123,000 to \$185,000 is the approximate cost of \$80,000 per airplane for installation. The final cost cannot be determined until the appropriate fix has been installed in all airplanes and fully verified.

Question. Is this cost the responsibility of the contractor, and if so, are they paying the cost?

Answer. Final assessment of costs will be made at contract settlement. The fix will be handled as a part of the total cost of performing the contract. That portion of those costs above the contract target cost are shared. That is, cost above target cost are shared on a 70/30 basis, (Government 70%, Contractor 30%) until the limit of the Government's obligation (ceiling price) is reached. Above ceiling price, the costs are borne completely by the contractor. Both the contract target cost and ceiling price, however, are subject to adjustments in accordance with the repricing clause of the contract which is now subject to dispute between Government and contractor. Thus, the final sharing of costs between the contractor and Government will be based on the contract target cost and ceiling price as finally adjusted.

Question. How much is this work delaying delivery of these planes?

Answer. It takes from 6 to 8 weeks to incorporate the wing fix in an airplane. However, there has been no significant impact on deliveries because of this program since the contractor fell behind schedule earlier this year. Production effectivity begins with production aircraft number 14 which is planned for delivery in May 1970. All prior delivered aircraft will have the wing fix incorporated by retrofit during this year, with the last of these scheduled for completion in October.

Question. How many C-5As has the Air Force taken delivery on and what is the delivery schedule on the remaining buy?

Answer. There are eight C-5s in the flight test program and four more have been delivered to the training unit at Altus AFB, Oklahoma. Our present schedule calls for delivery of the remaining aircraft at a rate of two per month through March 1970 with the rate increasing to three per month until final delivery in January 1972. There are two other schedules under consideration. The first would maintain the two per month through CY 1970 and then go to a three per month rate. This would extend our current schedule about six months. The second would maintain the two month throughout the program and extend our current schedule about 12 months.

Question. What are the reasons, besides the wing crack, for the naming of a panel to review the structural integrity of the C-5A?

Answer. The primary purpose of the Structural Committee of the Scientific Advisory Board is to review the wing reinforcement program. In the process of evaluating the engineering and testing that have been accomplished on the wing fix, the Committee is reviewing all of the wing structure to insure that the overall wing structure, with the reinforcement installed, is structurally sound. In addition, to have the best possible assessment of the total technical status of the aircraft, the SAB (Scientific Advisory Board) Panel will also review the C-5A structure in general and the performance and avionics aspects as well.

Question. Secretary Scamans, on the F-111, the Air Force claims it has a low accident rate, is that true?

Answer. The F-111 has the lowest accident rate of any Century Series fighter aircraft introduced into the USAF inventory. A comparison of accidents for 50,000 flight hours follows:

Type aircraft:	Number of major accidents
F-100	49
F-101	30
F-102	35
F-104	43
F-105	25
F-106	19
F-4	¹ 23
TO 144	2 17

As of 48,078 hours-Figures not available for 50,000 hours.

² Excludes 2 combat losses, cause unknown.

In addition, I would like to encourage anyone who is interested to review the statistics from a learning curve or experience factor standpoint. Note the decrease in the number of major accidents with a particular wing design type as we progressed from the earliest to the later aircraft, i.e., with the conventional swept wing design (F-100, F-101, F-105); with the delta wing design (F-102 and F-106).

The low rate for the first variable geometry wing aircraft or the F-111 results largely from its design. The design provides for lower take-off and landing speeds, both of which normally help to lower the accident rate.

Question. How can the Air Force determine if it is safe to buy more F-111s until some tests are made to thoroughly check its effectiveness at maximum capacity?

Answer. Enough work has been accomplished in the investigation and analysis of the structural flaw to provide some confidence. However, before the FY 1971 follow-on buy decision date is reached we will have accomplished sufficient tests and gathered far more data on which to base our decision.

Question. How are the Air Force and the contractor sharing the costs of the post-production F-111 problems?

Answer. If the problem is determined to be a deficiency, under terms of the contract, the Government and contractor will share the cost. Currently, the sharing is 85–15 with 85% being the Government's share.

Question. I believe we need an aircraft like the F-111. When are we going to get full proof that the F-111 can really perform up to its maximum specifications?

Answer. The work necessary to release the aircraft to the design limit involves not only the current inspection and proof test program, but also successful completion of the Structural Integrity Program (static, fatigue, and flight load tests). We expect to have verification of the soundness of the aircraft by the end of the year, with a large number of this aircraft flying by then. They should all be back in service by about May 1971.

Question. Why did the Air Force not make more thorough checks before accepting the F-111s we have already bought?

Answer. It was concluded from the review of findings and technical data that the flaw was introduced at a subcontractor facility at some point during the manufacturing process. Therefore, it falls within the area of quality assurance at a subcontractor facility. In this area, the Air Force must depend on established quality assurance programs which are monitored by the prime contractor.

Question. The Air Force is asking for \$206 million for missile modifications in FY 1971. Why do you need so much money to change missiles we have already bought?

Answer. Sir, these funds are necessary to provide us with a viable, up-to-date force. There are three essential categories of effort. The first category is the Force Modernization of the MINUTEMAN Launch Facility and Launch Control Facilities from a MINUTEMAN I to a MINUTEMAN II/III configuration. This will enable us to continue the planned modernization of our MINUTEMAN force with MINUTEMAN III missiles and phase out all the older MINUTEMAN I missiles. Funds for this effort total \$69.7 million. The second category of effort is the Class V and Update Modifications. These funds provide for correction of known deficiencies in our missiles discovered during testing or in-service use and for increased capability for missiles presently in the inventory, instead of necessitating new procurement. This requires a total of \$128.3 million. The final category of effort is Class IV modifications, which provide for safety of personnel or equipment, elimination of deficiencies causing mission aborts or improving maintainability, reliability and service life. This requires \$8.0 million.

Question. Give me a breakout of the missiles on which you plan to spend this money and the purpose of each expenditure?

Answer. Sir the majority of these funds, \$166.0 million, provide for the continuing modernization of our MINUTEMAN Force. As previously stated, \$69.7 million is required for Force Modernization of the MINUTEMAN Systems. These funds will provide new hardware and modification kits plus the removal, modification, installation and checkout effort required to change the configura-

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tion of the Launch Facility and the Launch Control Facility from a MINUTE-MAN I to the MINUTEMAN II/III and provide compatibility with these newer missiles. An additional \$96.3 million is required for Update of the MINUTE-MAN System during the Force Modernization effort. These funds provide for continuing the incorporation of In-Flight Airborne Hardness in the remaining MINUTEMAN II Missiles, updating MINUTEMAN II Training Equipment to MINUTEMAN III, and correction of other known hardware deficiencies in the MINUTEMAN System.

Fifteen million dollars will be used to modify [deleted] FALCON missiles to provide them with a blast fragmented warhead and a proximity fuze as well as

improved maneuverability.

Seventeen million dollars will be used to continue the modification of [deleted] SIDEWINDER missiles initiated in FY 1969 to provide an improved capability in the close-in, high G. maneuvering. Dogfight environment.

The remaining eight million dollars for Class IV modifications will be used

to provide for the requirements of all our missiles in the inventory.

Question. By what means do you plan to justify these modification costs?

Answer. Sir, these funding requirements have been examined very carefully. The vast majority of the funds, as stated before, are necessary to support the continuation of the planned modernization of our MINUTEMAN force with MINUTEMAN II/III missiles. In addition, the FALCON and SIDEWINDER missiles were proven to be deficient and lacking in an effective capability during our operations in Southeast Asia. To preserve the investment we have made in these missiles, we propose, through these modifications, to correct the combat revealed deficiencies and give them an improved capability. By incorporating these improvements in missiles currently in the inventory, we considerably reduce the cost over buying new missile, and, of course, acquire this capability at a much earlier date.

Question. Secretary Seamans, what level of budget restrictions were put on the Air Force for FY 1971 and where did you make the biggest weapon systems cuts to stay within your budget?

Answer. The FY 1971 Air Force budget was developed under guidelines that the Total Program could not exceed \$24,557.0 million. During the OSD/Bureau of Budget review the Air Force estimates were reduced in the amount of \$1,828.1 million. Major weapon systems reduced were:

[In millions of dollars]

A-7 aircraft (decrease of 62 aircraft)	¹ -148.8
F-4E aircraft (decrease of 45 aircraft)	· 1—145. 4
F-111 aircraft (decrease of 44 aircraft)	· 1—434. 1
C-5A aircraft (decrease of 10 aircraft)	·-243. 0
T-X aircraft (decrease of 4 aircraft)	₁ —45. 7
CH-53D aircraft (decrease of 22 aircraft)	₁ —46. 8
MINUTEMAN II/III (Quantity, Price & Program Adj.)	-42.4
AGM-65A MAVERICK (Program & Testing Adj.)	-46.5
B-1 aircraft (in RDT&E)	-96.0
Total	-1.248.7

¹ Includes initial spares.

The balance of the reduction applied to personnel, operating costs and other support cost.

COMMITTEE PROCEDURE

Chairman Stennis. Mr. Secretary, is there anything else you want to say before we close?

Secretary Seamans. No, I have nothing further to add, Mr. Chairman.

Chairman STENNIS, General?

General Ryan. Nothing further, Mr. Chairman.

Chairman Stennis. We are glad to have you gentlemen here. We are going to plow right on through this now. In order to get all the ins and outs, large and small matters covered, we might have to ask you gentlemen to come back.

Secretary Seamans. We will be happy to come back any time we

can serve your committee.

Chairman Stennis. And you are going to try very hard to make certain the things that have been uncertain in here. We want to take a bill to the floor that is tight and ready to go and that the money requested can be justified and, as far as we know, will be spent.

Secretary Seamans. On that score particularly with regard to the F-111 which I know you mentioned, we are just as anxious to resolve that question for our operational purposes obviously as you are to get

the facts, and I think everything is converging on a solution.

Chairman Stennis. All right. I hope you can keep it going in that direction. You know when we get the bill on the floor, you don't want to open the door to changes. You have to defend it as it is.

COMMITTEE RECESS

Thank you again, gentlemen, very much. We are glad to have had you here.

We will stand in recess until tomorrow at 10 a.m.

(Whereupon, at 4:35 p.m., Tuesday, March 10, the committee was recessed to reconvene at 10 a.m., Thursday, March 12.)

MILITARY PROCUREMENT, FISCAL YEAR 1971

WEDNESDAY, MARCH 11, 1970

U.S. SENATE,
COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The Committee on Armed Services met at 10:10 a.m., in room 212, Old Senate Office Building, Hon. John Stennis (chairman) presiding.

Present: Senators Stennis (chairman), Symington, Cannon, Byrd of Virginia, Smith of Maine, Thurmond, Dominick, Murphy, and Brooke.

Of the staff of the Committee on Armed Services: T. Edward Braswell, Jr., chief of staff; and Labre R. Garcia, professional staff number

Of the staff of the Preparedness Investigating Subcommittee: Ben J. Gilleas, director of investigations; Ed Kenney, Don L. Lynch, David A. Littleton, and George Foster, professional staff members.

DEPARTMENT OF THE AIR FORCE

PROCUREMENT

COMMITTEE PROCEDURE

Chairman Stennis. The committee will please come to order.

The committee continues today on the Air Force portion of the

authorization legislation.

We have with us Lt. Gen. Otto J. Glasser, Deputy Chief of Staff for Research and Development, who today will testify on the procurement portion of the Air Force request. The Chair might add that tomorrow General Glasser will testify on the Air Force R. & D. matters.

We also have with us Gen. James Ferguson, who is Commander of the Air Force Systems Command. General Ferguson is familiar to most of us as a result of his having appeared many times before the Armed Services and Appropriations Committees during his substantial tenure in the Pentagon. At the present time, as Commander of the Systems Command, located at Andrews Air Force Base, General Ferguson is responsible for managing the procurement of these major weapons systems. General Ferguson will address us regarding certain specific systems and be prepared to discuss all aspects of these systems—management, R. & D., and procurement.

We have none of the civilian authorities with us today. General Glasser is going to present testimony here to justify not only the

R. & D. matters but also the line items.

General Ferguson, do you have a prepared statement?

STATEMENT OF GEN. JAMES FERGUSON, COMMANDER, AIR FORCE SYSTEMS COMMAND; ACCOMPANIED BY LT. GEN. OTTO J. GLAS-SER. DEPUTY CHIEF OF STAFF, RESEARCH AND DEVELOPMENT

General Ferguson. I have submitted a prepared statement, Mr. Chairman, but in order to set the stage for questions that you and the members of the committee may like to ask of me and my major program directors, I would like to read 1 or 3 minutes of excerpts from my statement, if I may.

Chairman Stennis. We will hear you on anything you want to be heard on. You propose to put your statement in the record and then

make a few minutes' summary?

General Ferguson. Yes, sir. I would like to do that at the pleasure of the Chairman.

Chairman Stennis. All right, I will read out the names of the other gentlemen who are here supporting the principal witnesses. We are glad to have you gentlemen here whether we call on you or not. We

need you around.

Maj. Gen. Andrew S. Low, Jr., Director of Aerospace Programs, DCS/Programs and Resources; Maj. Gen. William F. Pitts, Director of Budget, Comptroller of the Air Force; Maj. Gen. K. W. Schultz, MINUTEMAN Program Director; Brig. Gen. B. N. Bellis, F-15 Program Director; Brig. Gen. A. L. Esposito, F-111 Program Director; Col. K. Beckman, C-5 Program Director; Col. K. Russel, AWACS Program Director; Col. D. M. Falk, SRAM Program Director; Col. R. Rushworth, MAVERICK Program Director; Col. H. W. Stoneberger, A-7 Program Director; and Col. C. E. Buckingham, Chief. Aircraft and Missile Programs Division, Assistant for RDA Programing, DCS/Research and Development.

I know you gentlemen are not afraid of the hard ones and you have got some rough ones in there. We give you a chance to say what you

wish about some of these.

All right, General, we will be glad to have you proceed. Will you

put your statement in the record, please?

General Ferguson. Yes, sir. Recognizing my statement has been submitted for the record, with your permission, I would like to say a few words setting the stage for discussion on the major programs of the Air Force that have been approved and directed on the Systems Command.

Chairman STENNIS. Yes. Let me get this straight now. Mr. Braswell here handles the record. He thinks that we ought to have General Ferguson's statement to follow, so it ought to show up that way in the record, so we will hear from you, General Glasser. Do you have a written statement?

General Glasser. Yes, sir. I, like General Ferguson, have a written statement that I have submitted to the committee. I would suggest, sir, that I briefly summarize what I will cover in that statement.

Chairman STENNIS. I think that a witness is entitled to considerable choice as to how he shall present his matters, but with these long statements, I think it is well to put them in the record.

There is a reason for that. We are not just trying to build up a thick record here. All Senators as well as the public are entitled to receive the testimony here, as much as can be made available about any item in this bill, but we want you to concentrate on the ones you think need the most attention.

All right, Mr. Reporter, put the full statement of the General in the record, and you proceed.

(The statement follows:)

Mr. Chairman and Members of the Committee, it is indeed a pleasure to address this committee and to present the Air Force's proposed Aircraft and Missile Procurement program for fiscal year 1971. In seeking your approval of this program, I shall first review some of the purposes for which our systems have been developed. We'll look at the particular capabilities for which we are asking support today in the context of those already in our operating forces. Next, I shall identify the need for each of the acquisitions we are requesting this year. Finally, in anticipation of the Committee's desire to explore certain of our major programs in depth, we have arranged for the Commander, Air Force Systems Command, General Ferguson, and his Program Directors to discuss these major procurements with you and respond to your detailed questions. I suggest that your detailed questions on the MINUTEMAN, SRAM, F-111s, C-5, AWACS, F-15, A-7D and MAVERICK, be held for that opportunity.

AIR FORCE MISSION CAPABILITIES

In his recent statement to you, General Ryan identified the different mission areas for which national policy requires the Air Force to maintain capabilities, and both he and Secretary Seamans outlined the major efforts by which we intend to achieve them. I should like to review these capabilities briefly and relate them to the specific systems which the Air Force needs to procure in order to carry out its assigned missions.

STRATEGIC FORCES

In the strategic area, it is national policy to maintain the capability for assured destruction—that is, to maintain forces of sufficient quality, size and diversity to deny a potential attacker any reasonable chance of carrying out a disarming first strike against us. In accordance with the policy outlined by Secretary Laird, this means that both our bomber and missile forces must maintain the capabilities for effective survival, defense penetration and target destruction needed to cope with relevant enemy capability improvements. It also means that we need to maintain sufficient defensive capabilities to deny him a potential for selective erosion of our ability to counter massive attacks.

General Ryan has outlined several Soviet weapon developments which could affect our future strategic offensive tasks. As Soviet defense improve, we will need bombers with better penetration capabilities and missiles with harder and more versatile re-entry vehicles. As Soviet ICBM's proliferate and their accuracies and payloads increase, we will need to increase the numbers and/or to increase the pre-launch survivability and improve the mission flexibility of both of our retaliatory systems. With our bomber force being reduced in numbers and our missile launch systems held at a constant level, our security of necessity depends on qualitative improvements and selective replacement.

Our procurement proposals this year are designed to provide us with capabilities to penetrate improved bomber and missile defenses and to retaliate effectively against a greater number of targets. We are hoping to acquire an initial increment of short range attack missiles (SRAM) to begin equipping our B-52G/H force, and thus extend the useful life of this weapon system. We are also requesting authority to procure MINUTEMAN III missiles so that we can maintain a substantially increased capability for assured delivery of warheads on target. By contrast, our current procurement request does not provide for any modernization of our aging defensive forces. Thus, if we are to maintain sufficient defensive capabilities, we shall have to seriously address this area in subsequent procurement actions.

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GENERAL PURPOSE FORCES

In the tactical/general purpose area, there are many variables which shape the capability requirements of our forces. Tactical force needs are dependent upon the geographical range and nature of our mutual defense treaty commitments and the kinds of contingencies which the national authority determines must be met. The size and mix of our tactical air forces are also conditioned by the surface-to-air and the air capabilities of potential enemies and our allies. In general, however, we must maintain forces equipped to respond promptly and effectively should they be called upon to help defend the territories of our treaty allies or nations whose defense is judged vital to our own national security interests.

The war in Southeast Asia has taken its toll among our general purpose forces. The need to replace our losses with current operational equipment consumed valuable resources which otherwise might have been devoted to the development of new tactical aircraft. In this type of conflict, in which total mobilization and emergency economic controls are out of the question, these are trade-offs that probably cannot be avoided. Still, we recognize that the impact of such choices on future operational capabilities may be significant unless we are now able to carry out much delayed and needed modernization measures. This is particularly the case since the development efforts of our most likely opponents in future contingencies have not been constrained by wartime attrition and priorities. On the contrary, the Soviet Union has developed a whole family of advanced tactical aircraft, and they continue to follow their policy of providing their first-line equipment to other Communist and non-Communist governments.

Our current procurement request provides for probably the smallest buy of Air Force fighter aircraft since 1938. Consequently, it will enable us to make only modest advances toward replacing the F-100s and F-105s in our tactical inventory. The 88 A-7Ds will help build toward a force of subsonic jet aircraft intended primarily for the close support mission and potentially useful in other attack roles where air superiority is assured. On the other hand, the 24 F-4Es and 12 RF-4Cs will provide only for attrition replacement. To give our tactical forces greater effectiveness, we are requesting funds this year to begin production on the air-to-ground MAVERICK missile and to procure additional air-

to-air Sparrow missiles.

AIRLIFT FORCES

The pacing elements for airlift capabilities are treaty commitments and national policy toward the basing of U.S. forces on foreign soil. Without large numbers of forces well forward in the treaty regions, our ability to fulfill our commitments will be heavily dependent upon the capacity and performance of our airlift forces. We need the capability to rapidly deploy ample quantities and types of combat forces from their bases in the United States to the zones of aggression. We also need the capacity for assisting our allies with the necessary logistical support for their own defensive efforts. Finally, we need ways of quickly moving deployed troops and supplies from major receiving points in the combat theater to the immediate battle area.

Procurement actions in recent years have enabled us to support our immediate needs in the airlift area. Our future strategic lift requirements have been partially provided for in the fiscal year 1970 and prior procurement appropriations for the C-5A. Our future tactical airlift requirements for force modernization are now under study. The only increased transport capability provided by this year's procurement request is for nine C-9A aircraft, used only for aeromedical evacuation.

With this overview of proposed mission capabilities, let us now examine the individual requests in our fiscal year 1971 procurement program. I will discuss Aircraft Procurement and Missile Procurement, in that order.

AIRCRAFT PROCUREMENT

The Aircraft Procurement program includes 390 aircraft of 10 different types. Of this number, only 177 aircraft are for U.S. forces; the remaining 213 are for other nations through the Military Assistance Service Funded (MASF) program. These—together with the funds requested for modifications, spare parts, and other support—are listed in Table I. The table indicates how many aircraft of each type are to be procured and the funds required

The direct program cost of the fiscal year 1971 Aircraft Procurement requestotals \$3.514.3 million. This is approximately \$1.27 billion and \$440 million less than the \$4,783.1 million and \$3.954.4 million programmed for fiscal years 1969 and 1970, respectively. Included in the total direct program are aircraft and related support items for the forces of South Vietnam, Thailand and Laos (provided through MASF). The reimbursable program is estimated at \$400.0 million, for a grand total current program of \$3,914.3 million. This year, for the first time, a line item representing the estimated unobligated balances of fiscal year 1969 and prior year programs (as of 30 June 1971) is also included. It will be requested that this sum be rescinded from prior year appropriations and reappropriated in the fiscal year 1971 program. Thus, the total program cost for fiscal year 1971 includes an additional \$59.4 million and amounts to \$3,973.7 million overall.

Our request for new obligational authority to support the fiscal year 1971 aircraft procurement amounts to \$3,374.3 million, including the \$59.4 of prior year unobligated balances. The rest will be obtained through: (1) application of the reimbursements from the Military Assistance program. Foreign Military Sales and from other customers, in the amount of \$425.0 million; (2) decreasing the fiscal year 1970 program and repricing various prior year items, in the amount of \$124.4 million; and (3) recoupment action in the amount of \$50.0 million.

TABLE I.—DEPARTMENT OF THE AIR FORCE FISCAL YEAR 1971 AIRCRAFT PROCUREMENT ESTIMATES

[In millions of dollars]

	Quantity	Estimate
ombat aircraft:		
A-7D attack	88	\$242.
F-4E fighter	24	` 77.
F/RF-5A B fighter/reconnaissance	8	10.
F-111D/F tactical fighter (tentative)	40	483.
International fighter		30.
RF-4C reconnaissance	12	42.
Subtotal.	172	886.
irlift aircraft:		
C-5A cargo:transport		544.
C 9A aeromedical transport	9	39.
Subtotal	9	583.
rainer aircraft:		
T-37C pilot trainer	5	1
T-41C/D pilot trainer	8	-
T-X navigator trainer	Ä	39
Subtotal	17	40
ther aircraft:		
UH-1H utility helicopter	180	46
U-17 utility aircraft.	12	
Subtotal	192	47
odifications		537
pare and repair parts		599
ther support:		
Common ground equipment	••••	93
Component improvement		32
Industrial facilities.	••••••	27
War consumables		12
Other charges		653
Total, direct program	390	3, 514
eimbursable program		400
Total program (current)		3, 914
Total program (current)		59
Total program		3, 973
Less estimated available financing:		
Reimbursable orders		425
Estimated recoupments		174

Combat aircraft

A-7D:	
Speed (maximum)	607 knots
Range (ferry)	
Ceiling (combat)	31, 500 feet
Mission load (maximum)	15,000 pounds
Average unit flyaway cost	\$2,668,000
Average program unit cost	\$3, 607, 000

The A-7D is a single place, tactical strike fighter being procured primarily to provide close air support for ground forces. When performing this mission, its design provides it with twice the range and loiter time of our basic multipurpose fighter-bomber, the F-4, while carrying a 25 percent larger bombload. It is also equipped with armor and other survivability features that reduce its vulnerability to ground fire. The A-7D avionics system has been designed for accurate weapon delivery even under conditions of poor visibility. A navigation/weapon delivery computer that can be activated by either visual or radar means provides a continuous solution of the bombing problem until weapon release.

This weapon delivery sub-system and others are now undergoing extensive contractor testing in six aircraft. These include live bomb drops on the calibrated range at Eglin Air Force Base. Other testing is focusing on system and performance evaluation. To date, the tests have indicated that our engine, airframe, navigation and weapon delivery objectives are attainable.

The currently planned procurement of 387 A-7D aircraft is designed to support the absolute minimum force required to meet basing, training, logistical and operational needs. With the funds now available we will be able to attain a force of approximately two wings. The 88 aircraft requested in fiscal year 1971 (\$216.7 million) will complete equipage of the second wing and begin the build-up of the third wing. We are also requesting \$26.0 million for advance procurement of long lead-time items for the remaining aircraft. These will be procured during fiscal year 1972 to complete the third wing and to provide for attrition replacements.

F-4E:

Speed (maximum)	2.15 Mach.
Range (ferry)1, 637	
Ceiling (combat)	
Mission load (maximum)	10, 796 pounds
Average unit flyaway cost	\$2, 530, 000
Average program unit cost	

The F-4E is a twin-jet fighter/fighter-bomber which can perform the roles of air superiority, close air support and interdiction. Together with its C and D model forerunners, it has become the workhorse of our tactical air forces in both Europe and the Pacific. The F-4E's engines give it increased thrust over the earlier models. Like the other F-4s, its avionics provide for all-weather navigation and for air-to-air and air-to-ground missile attacks. The aircraft is capable of both nuclear and conventional weapon delivery.

A total procurement of F-4E aircraft, together with the C and D models, is required to support the approved force through fiscal year 1975. To date, 680 F-4Es have been procured. Fiscal year 1971 and subsequent procurements will provide attrition replacements. The low production rate sustained for this purpose will also enable us to maintain an active fighter production line until the introduction of the F-15 into the force. We are requesting \$71.3 million for procurement of 24 replacement aircraft in fiscal year 1971 and an advance procurement of \$6.0 million for long lead-time items to support a like buy in fiscal year 1972.

F/RF-5:

Speed (maximum)	1.38 Mach.
Range (ferry)	1.145 nautical miles.
Ceiling (combat)	
Ordnance (maximum)	
Average unit flyaway cost	
Average program unit cost	

The F-5A is a small tactical fighter being procured for the Military Assistance Service Funding (MASF) program. The RF-5A is an F-5A with four cameras installed in a reconnaissance nose section. Through fiscal year 1970 we expect

to procure a total of 64 F/RF-5 aircraft for free world forces. To date, we have funded a number of F-5As, F-5Bs, and RF-5As for the South Vietnamese Air Force. F-5As and RF-5As are also designated for Thailand and F-5As for South Korea.

This year we are requesting \$10.3 million to procure five F-5As and three RF-5As. All eight aircraft are required as attrition replacements.

International flyhter aircraft

Current U.S. foreign policy has pinpointed the need for a credible national self-defense capability in South Vietnam and Thailand, and possibly in Taiwan and South Korea. An appropriate air defense aircraft is to be competitively selected from proposals submitted by U.S. industry and provided to these nations under the MASF program. The intended aircraft will be optimized for air-to-air combat, but will retain as much residual fighter/attack capability as possible consistent with its primary role of air superiority. It will be relatively simple, inexpensive and competitive in the foreign sales market.

\$28 million of Air Force resources have been programmed in fiscal year 1970 to initiate development of this aircraft. The Air Force is requesting \$30 million in fiscal year 1971 to continue its acquisition. The quantity, as well as the actual breakout between RDT&E and procurement, will be dependent on the aircraft selected.

F-111D/F:

Speed (maximum)	2,4 Mach.
Range (ferry)	2,500/2,610 nautical miles.
Ceiling (combat)	55,150/58,200.
Payload (maximum)	32,500 pounds.
Average unit flyaway cost	\$ 8, 093 , 0 00.
Average program unit cost	\$13,319,000 .

The F-111F is the latest model in a series of swing-wing F-111 tactical fighters. Like its F-111D predecessor, it will have the capability to operate from bases at extended range from its targets, to penetrate sophisticated defenses and to find and carry out attacks at night and in all weather. The F model differs from the F-111D only in its engine and its avionics system. It is equipped with the new P-100 engine, which provides a 25 per cent increase in thrust over the older model. Its avionics package is expected to be less costly than the Mark II system planned for the D model but will retain similar navigation capabilities and enable comparable air-to-ground attack performance against fixed targets. The F-111F will be an excellent system for interdiction, in which the timing of the attack, irrespective of weather and defenses, can be all-important.

The total authorized F-111 A/E/D/F procurement through fiscal year 1970 is 406 aircraft. To date, 189 (including 17 RDT&E aircraft) have been delivered. The 406 authorized aircraft will support a three-wing force. The Air Force hopes to complete the originally projected four-wing force once we determine the cost of solving the current structural problem which has grounded the F-111 fleet.

We have included \$483.5 million for the F-111 program in the fiscal year 1971 request. \$200.5 million of this amount is applicable to over target costs for fiscal year 1969 and prior procurements. The balance of \$283 million will be used to defray costs of the corrective measures necessary to unground the F-111 fleet and to purchase up to 40 additional F-111F aircraft. We will, of course, keep the Congress informed of our progress and request approval of the finally determined F-111F quantity.

RF-4C:

Speed (maximum)	2. 11 Mach.
Range (ferry)	1.418 nautical miles.
Ceiling (combat)	55, 800, feet.
Average unit flyaway cost	\$2, 455, 000.
Average program unit cost	\$3, 137, 000.

The RF-4C is a reconnaissance version of the F-4 and is used in support of both tactical air forces and ground forces. It has both a day and a night photographic capability and is equipped with side looking radar and infrared sensors. The aircraft has seen extensive service in Southeast Asia. The first squadron became operational in August 1965.

RF-4C aircraft are currently programmed to support existing squadrons and replace attrition losses. Using the appropriations through fiscal year 1969 we have procured a total of 481. Fiscal year 1971 and subsequent procurement of the RF-4C will provide 36 attrition aircraft.

Last year, Congress eliminated the RF-4C procurement program, leaving \$5.9 million in advance procurement funds to support the fiscal year 1971 buy. We are requesting \$38.2 million this year which, with the funds carried forward, will procure 12 of these aircraft for attrition replacement. We are also requesting \$4.5 million in fiscal year 1971 funds for advance procurement of long lead-time items for a follow-on buy of aircraft in fiscal year 1972.

Airlift aircraft

C-9A:	
Speed (maximum)	470 knots.
Ceiling	43, 500 feet.
Range (ferry)	7, 200 nautical miles.
Payload (basic mission)	100,000 pounds/5,560 nautical miles.
Average unit flyaway cost	\$29, 725, 000.
Average program unit cost	\$53, 211, 000.

The C-5 transport is the largest aircraft ever built, in terms of gross weight and payload capacity. It has flown at a take-off gross weight of 798,200 pounds or almost 400 tons—a world record. This is 17 tons in excess of its designed maximum take-off weight. Its payload capacity enables us, for the first time, to

move nearly all Army divisional support equipment by air.

Total procurement of the C-5 is 81 (including five development aircraft). Production of these aircraft has been authorized and supported with fiscal year 1970 and prior funds. However, other aspects of the acquisition program will require additional funding. In fiscal year 1971, we are requesting \$344.4 million to cover prior-year unfunded deficiencies and \$200.0 million to provide a reserve fund. This latter figure is for contingencies pending settlement of disputed portions of the contract. Pending the final outcome of current negotiation/litigation, there may be some additional funding required beyond 1971.

C-9A:

Speed (maximum)	490 knots.
Ceiling (cruise)	35,000 feet.
Range (ferry)	
Payload (maximum)	
Average unit flyaway cost	
Average program unit cost	\$4 , 117, 000.

The C-9A is a medium sized, twin-jet DC-9 transport configured to carry both litter borne and ambulatory medical patients. These aircraft will make quicker and more efficient transit available for those personnel in need of the medical

skills and equipment that can be found only at hospitals.

The fiscal year 1971 procurement of nine aircraft will modernize the medical evacuation fleets in Europe and the Pacific by replacing five C-118s and five C-131s in Europe and seven C-118s in the Pacific area. At present, the 12-aircraft CONUS C-9A fleet is supported logistically by a contractor, and the aircraft operational readiness rate has been maintained at about 94 per cent, as compared with the standard 80 per cent. We are considering arrangements for contractor support of the USAFE and PACAF fleets as well.

We are requesting \$39.5 million for the nine C-9As in fiscal year 1971. The firm fixed price contract awarded for initial purchase of this aircraft in 1967 contains options for additional buys. Our fiscal year 1971 procurement will be

obtained under this contract.

Trainer aircraft

T-37C:		
Speed (maximum)	382 knots.	
Range (ferry)	580 nautical	miles.
Ceiling (operational)	25, 000 feet.	
Average unit flyaway cost	\$218,000.	
Average program unit cost		

The T-37C is a trainer aircraft used in support of the Military Assistance Service Funded (MASF) program to train primary phase students from foreign air forces to operate military jet aircraft. It is a low-wing two place subsonic jet with dual controls. We are requesting \$1.1 million to procure five T-37C aircraft.

T-41D:

Speed (maximum)	130 knots.
Range (ferry)	620 nautical miles.
Ceiling (service)	
Average unit flyaway cost	
Average program unit cost	

The T-41D is an "off-the-shelf" trainer aircraft used in support of the MASF program. In fiscal year 1971, we are requesting \$200 thousand to procure eight T-41D aircraft.

T-X:

Speed (maximum)	490 knots.
Range (ferry)	2.600 nautical miles.
Ceiling	
Students	
Average unit flyaway cost	\$7, 381, 000.
Average program unit cost	

The T-X Navigator Trainer will be a converted medium-sized, twin jet transport of the DC-9/737 type equipped to train navigators in a setting more closely resembling the operational environment of our modern strategic, tactical and transport aircraft. This trainer will provide for simultaneous training for 12 students in the essential skills, techniques and procedures of air navigation and provide additionally for continuation of navigation training for four navigator/bombardier students. There will be 19 navigator stations aboard the aircraft, to include provision for three instructors.

Our requested fiscal year 1971 procurement of four aircraft represents the initial aircraft buy of a planned program coupling 16 trainers with 46 ground simulators. The Congress approved an initial buy of simulators in fiscal year 1970. The 16 aircraft, supplemented by the ground navigator training simulators, will enable us to conduct modernized undergraduate navigator training at a considerable overall cost reduction. Through this "systems" approach, the Undergraduate Navigator Training Course will be cut from 38 to 33 weeks; the Navigator-Bombardier Training Course will be cut from 28 to 15 weeks. In addition, replacement of 79 obsolete T-29 aircraft with the 16 jets will result in substantial savings in air crew and support personnel and in maintenance and operating costs. We estimate that when fully implemented the program will result in overall annual savings of more than \$27 million.

We are requesting \$39.3 million for the four aircraft and have included \$22.4 million in our Common AGE requirement for 14 ground based simulators.

Other aircraft

UH-1H:

120 knots.
284 nautical miles.
20.000 feet.
2/13/6.
\$259.000 .
\$282,000.

The UH-1H helicopter is a tactical personnel or light cargo carrier being procured in support of the MASF program to modernize free world forces in Southeast Asia. It will carry 13 passengers or 4,600 pounds of cargo. This helicopter will enhance the capability of the South Vietnamese and Thai Air Forces to assist their respective governments' efforts to counter insurgency. It will also improve their overall defense postures through building towards planned numbers of South Vietnamese Air Force (VNAF) and Thai Air Force squadrons.

Some years ago we initiated a program to procure UH-1 type helicopters to support these force levels. In fiscal year 1971 we are requesting \$46.6 million to procure 180 helicopters.

U-17B:

 Speed (maximum)
 155 knots.

 Range/payload
 400 N. M./1200 pounds.

 Ceiling (service)
 17,500 feet.

 C'rew/passenger/litters
 1/5/1.

 Average unit flyaway cost
 \$32,000.

 Average program unit cost
 \$34,000.

The U-17B is a lightweight single-engine, fixed wing utility aircraft also used in support of the MASF program. It serves as an observation aircraft and small transport for personnel and light cargo.

We are requesting \$400 thousand to procure 12 U-17B aircraft in fiscal year 1971. These aircraft will be utilized for forward air control (FAC) operations by free world air forces in Southeast Asia.

MODIFICATIONS

The Modification Program provides funds to support projects of two kinds: (1) improvements in the operational capabilities of our present aircraft weapon systems and (2) changes to correct "safety of flight" shortcomings, extend service life, and enhance reliability and maintainability of the systems.

Related to this latter kind of modification is the fact that 56 percent of our active aircraft inventory is at least nine years old; the corresponding figure was 34 percent in 1964. This fact, coupled with the significantly increased utilization rates attained during combat operations, has required us to undertake structural modification programs on the F-100, C-124, A-37, C-130 and KC-135 aircraft. Other aircraft will soon require the same attention. In the current fiscal year we are completing procurement of the stability augmentation modification for the B-52G/Hs. When installed, this modification should assure the soundness of these bombers through the end of the decade. In addition, as we indicated in last year's testimony, we are initiating work to improve the reliability and maintainability of the F-106 interceptor.

The major portion of the modification program is directed toward improving the capabilities of existing weapon systems. This year, we are completing work on the highly successful AC-119 and AC-130 Gunships. Selected F-4 aircraft are receiving a scan converter radar display for improved TV/EO weapon delivery. RF-4s in Southwest Asia are being equipped with a new side-looking radar to afford better radar reconnaissance. A prototype for improvements to the B-52 ECM capability was also initiated during the current fiscal year and will continue in fiscal year 1971.

For fiscal year 1971, we are requesting \$537.4 million. This will support work on safety of flight, maintainability and extension of aircraft service life in the amount of \$139.0 million and various classified projects totaling an additional \$59.0 million. The balance will permit various capability improvements to include continuing the AIMS program to provide radar beacons in support of a 1 January 1973 implementation of the new Air Traffic Control Environment. Also included will be procurement to modify the B-52 and FB-111 aircraft to enable them to carry the Short Range Attack Missile (SRAM) and to complete installation of the Adverse Weather Aerial Delivery System (AWADS) on the C-130s.

AIRCRAFT SPARES AND REPAIR PARTS

This program includes initial and replenishment recoverable spares (investment items), including spare engines, to support the planned activities of our aircraft inventory. This inventory includes both in-service and new procurement aircraft. The spares programs also include support for the modification of aircraft and the maintenance of Aerospace Ground Equipment (AGE), both peculiar and common.

The fiscal year 1970 program contained some substantial compressions and reductions in both end items and support cost requests. We have continued our compression of pipeline levels and deferred certain spare parts buys wherever procurement lead-time and operational activities would permit.

In fiscal year 1971 we are requesting a total of \$599.0 million for this combined program: this is 36 per cent less than the \$935.6 million we requested for fiscal year 1970. Last year's request for *initial* spares totaled \$450.6 million; our request this year is for \$193.1 million. This figure includes \$120.5 million for new weapon system procurement support, \$5.0 million for the support of

new common Aerospace Ground Equipment, and \$67.6 million for the support of aircraft and equipment modifications. This year's request for replenishment spares is \$405.9 million as compared to \$485.0 million in fiscal year 1970.

COMMON AEROSPACE GROUND EQUIPMENT (AGE)

This program provides for the procurement of organizational, base and depot level AGE used in direct support of aircraft (when applicable to more than one type of weapon system). It also satisfies AGE requirements for out-of-production aircraft and for aircraft being modified. The equipment is used on the flightline, in maintenance shops, in hangars, and in our depots. It contains such items as generators, de-icers, hydraulic test stands, engine test stands, radio and radar test stands. LOX plants, munitions handling equipments, non-destructive inspection equipment and general purpose trainers.

Our fiscal year 1971 request of \$93.9 million contains \$22.4 million for 14 ground navigator training simulators, which accounts for the significant increase above the fiscal year 1970 program. Of the balance in the 1971 request, \$63.9 million is required to provide initial equipage for our inventory of newer weapon systems and modified aircraft. The remaining \$7.6 million is to replace items which are worn out and on which annual repair costs exceed the amortized

annual cost of new equipment.

COMPONENT IMPROVEMENT

The Component Improvement program provides funds to improve Government Furnished Aeronautical Equipment (GFAE)—primarily aircraft engines. The objective of this program is to correct service revealed problems which develop after qualification, and to improve the engine's durability, maintainability and reliability, thereby extending its service life. As an example, we have been able to increase the time between periodic inspections on the J-85 engine from 200 hours to 800 hours by increasing the life of some of the engine parts. In terms of labor alone, a maintenance cost of \$52.4 million was averted over a five year period. Additional savings will accrue in spare parts and related items.

This year, we are requesting \$32.0 million to continue the Component Improvement program. Of this amount, \$13.2 million is planned for the TF-30 engine installed in the F/FB-111; \$6.8 million is planned for the TF-41 engine in the A-7 and \$4.0 million for the TF-39 engine in the C-5. The remaining \$8.0 million will be used to improve engines on other aircraft, such as the HC-130, F-4, F-5,

and HH-53.

INDUSTRIAL FACILITIES

The Industrial Facilities program has the basic objective of maintaining a modern industrial base which can assure the delivery of systems and equipment in peacetime as well as being able to respond to wartime needs. It provides for the timely establishment and improvement of manufacturing processes, techniques and equipment required to support current and projected Air Force programs. Included within its purview are the costs of shipping industrial equipment to the Defense Industrial Plant Equipment Center or to other users, and of replacing obsolete Government-owned machine tools. This program also supports the Air Force Industrial Readiness and Mobilization Planning program.

For fiscal year 1971, we are requesting a total of \$27.5 million for the Industrial Facilities program. This includes \$6.1 million for the rehabilitation of real property at 15 different plants, \$6.9 million for the rehabilitation of personal property at 18 different facilities, \$1.5 million for the packing, crating, and handling of machine tools and equipment, \$6.0 million for the new manufacturing methods program, and \$7.0 million for the replacement of obsolete Government-owned production equipment. In this latter case, continued Government ownership within the Industrial Readiness/Mobilization Production Planning Program is considered essential for Air Force production and mobilization production requirements.

WAR CONSUMABLES

This program provides for the procurement of War Readiness Material (WRM) requirements for auxiliary fuel tanks, pylons and ejector racks. Under certain wartime or emergency conditions, these are normally jettisoned from our fighter aircraft.

In fiscal year 1971 we are requesting \$12.9 million for this type of equipment. These funds along with prior funded assets will afford limited wartime support for the 1 July 1972 force levels and will provide for a production base that could be expanded in the event of continued hostilities. Aircraft to be supported are the F/RF-4, F-100, F-111 and A-7.

OTHER CHARGES

The Other Charges program provides primarily for classified projects, electronic countermeasure (ECM) pods, and Quick Reaction Capability (QRC) projects. This latter category has enabled us to respond to urgent or unforeseen operational requirements resulting from improvements in enemy techniques

In fiscal years 1970 and 1971, we plan to devote our QRC production activities to placing radar jammers on our aircraft and making our ECM pods effective against surface to air missile radars. These radars are now deployed among the Warsaw Pact nations and could appear elsewhere. Through fiscal year 1970, we have procured sufficient ECM pods to equip a portion of our tactical fighter/ reconnaissance forces. Procurement of the remaining required pods will be

programmed over the next four years.

For fiscal year 1971, we are requesting \$653.6 million for Other Charges. Included in this amount is \$561.5 million for classified projects, \$8.8 million for Quick Reaction Capability projects, and \$48.0 million for ECM pods, some of which will replace attrition in Southeast Asia. For the first time, we have also accumulated all costs for First Destination Transportation in this program. We require \$3.4 million to cover the delivery of weapon systems and other hardware items to their initial receiving points.

REIMBURSABLE PROGRAM

The reimbursable program of \$400.0 million is for aircraft, modifications and associated equipment which the Air Force will procure on a reimbursable basis to satisfy customer orders. Our customers include other Federal agencies and foreign governments not supported under the MASF program.

SUMMARY

The Aircraft Procurement Program request for fiscal year 1971 totals \$3,973.7 million for aircraft and aircraft support. Over half of this amount is designated for modifications, spares and other support, the vast bulk of the latter being for ECM, QRC and classified projects. Even including an appropriate portion of the requested modification program, only about 18 per cent of the total Aircraft Procurement request will contribute directly to modernization of our tactical forces. Approximately 2.5 per cent will support the Military Assistance Service Funded program, and the remainder will provide for attrition replacement and incurred contractual obligations.

It is planned to finance this total program from the request for new obligational authority amounting to \$3,374.3 million. \$425.0 million will be obtained through estimated reimbursement from sales to customers and \$174.4 million will come from changes to and recoupment from prior year programs.

MISSILE PROCUREMENT

Mister Chairman, I will now present the Air Force Missile Procurement program for fiscal year 1971. This program is summarized in Table II, and contains strategic ballistic missiles, strategic air-to-surface missiles, air-to-air missiles, and Shrike guidance head components. It also includes funds for target drones.

The required funding for this missile procurement program is \$1,580.1 million. which also includes the Aerospace Ground Equipment and services required to support these programs. We anticipate a reimbursable program in fiscal year 1971 in the amount of \$5.4 million. In addition, just as in the aircraft program, a line item representing a \$14.0 million portion of the estimated fiscal year 1969 and prior year programs is to be rejustified. It will be requested that this be rescinded in the prior year programs and reappropriated in fiscal year 1971. This will bring the total program to \$1,599.5 million.

To support this fiscal year 1971 procurement program for missiles, equipment and services, we are requesting \$1,544.6 million in new obligational authority. The balance of the financing will draw on the \$5.4 million reimbursements program, a planned recoupment of \$30.0 million from prior year funds, and the \$19.5 million available from the unobligated balance in fiscal year 1970.

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TABLE II.—DEPARTMENT OF THE AIR FORCE, FISCAL YEAR 1971 MISSILE PROCUREMENT ESTIMATES [In millions of dollars]

	Туре	Quantity	Estimates
MINUTEMAN II/III	Strategic ICMB		\$475. 7
SHRIKEMAVERICK	Antiradar	· · · · · · · · · · · · · · · · · · ·	9. 7 25. 0
SRAM			99. 5
SPARROW			14. 4
Target drones	Drone		13. 7
Modifications			206. 0 64. 6
Spere and repair parts			671.
Total direct program			1, 580, 1
Reimbursable program			5. 4
Total program (current)			1, 585. 5
Prior program year to be rejustified			14.0
Total program			1, 599. 5
Less estimated available financing: Reimbursable orders		=	5, 4
Estimated recoupments. Unobligated balance (fiscal year 1970).			30. 0 1 9 . 5
New obligational authority required			1, 544. 6

BALLISTIC MISSILES

Minuteman II/III

MINUTEMAN III is our most advanced ICBM system and is designed for the nuclear retaliatory mission. Its in-flight characteristics give it better survivability, pentration capability and accuracies than the older MINUTEMAN systems, and with the Mark 12 Multiple Independently Targetable Re-entry Vehicle (MIRV), each missile will be able to attack more than one target simultaneously.

As General Ryan indicated, our current objective is a force composed of both MINUTEMAN II and MINUTEMAN III missiles. Achieving the desired force balance on schedule is dependent on a number of production and testing milestones. To date, the MINUTEMAN III R&D test program is progressing satisfactorily; it has established the operability of the improved third stage and the technical feasibility of the Mark 12 MIRV concept. Among future milestones are several operational tests and tests of different source guidance systems. To support these testing programs, provide essential spares and hold to the programmed yearly average deployment rate, a large number of MINUTEMAN III missiles are required by the end of the fiscal year 1971 funded delivery period.

Current funding provides for procurement of missiles. Accordingly, we are requesting \$475.7 million to procure MINUTEMAN III missiles and peculiar MINUTEMAN II equipment in fiscal year 1971. This sum includes \$28.5 million for the advance procurement of long lead-time items.

SHRIKE (AGM-45A)

The SHRIKE is an anti-radiation missile designed to detect and destroy enemy ground radars by homing on their source of radiation. It is currently carried on certain F-105 and F-4 aircraft, called Wild Weasel, with special radar homing and warning equipment. The missile has been operational in Southeast Asia since April 1966.

SHRIKE warheads, motors, control sections and guidance heads are interchangeable. Development efforts have resulted in guidance heads that provide for missile effectiveness against enemy early warning, ground control intercept, and missile (SAM) guidance radars, each of which employs a different frequency range. Based upon the specific radar to be attacked, the operational commander selects the most appropriate weapon option. Since our operational environment constantly changes, our objective is to procure guidance heads which cover the major target radar types.

This year we are requesting \$9.7 million to procure SHRIKE guidance heads designed for use against the more advanced models of the SAM guidance radars. This quantity, in conjunction with a similar Navy fiscal year 1971 buy, provides a minimum sustaining production rate.

MAVERICK

MAVERICK is a very accurate electro-optically guided missile. It will be carried in the F-4 and A-7 and will give these aircraft an operational capability they cannot achieve with present and other programmed ordnance. This missile successfully completed its first guided test flight at Holloman AFB, New Mexico on December 18, 1969. Its performance was impressive; the target, a tank, was hit squarely from a substantial range.

Effective support of our commitments to assist in the defense of treaty allies requires a capability which only the MAVERICK can provide. Accordingly, we are requesting \$25.0 million in fiscal year 1971 to permit the purchase of long

lead-time tooling and the initiation of production on pacing items.

SRAM (AGM-69A)

The Short Range Attack Missile (SRAM) is an air-to-surface missile with a nuclear warhead. It is being developed to provide bombers with the capability to attack terminally defended targets despite Soviet measures to strengthen their terminal defense systems. The missile is intended to penetrate terminal defenses and strike mission targets while the bombers stand off outside the lethal range of these defenses. When necessary, SRAM will also allow us to attack enemy SAM sites and AAA sites so that the bombers can then strike the primary targets with other SRAMs or gravity bombs. The SRAM will be compatible with modified B-52s and FB-111s and will be an integral weapon system for the B-1.

The impact of improved enemy defenses on bomber penetration capability is particularly grave with respect to the B-52s. Yet, until the B-1 is ready for operational deployment, no earlier than the late 1970's, the B-52s will remain the backbone of our strategic bomber force. The SRAM is needed to help maintain their retaliatory capability. Accordingly, we are requesting \$99.5 million for fiscal year 1971 to continue the establishment of production rate tooling, started this year, and to produce the initial increment of SRAMs.

SPARROW (AIM-7E)

The SPARROW is a radar guided air-to-air missile that provides an all-angle attack capability under all weather conditions against high performance air-craft. It can be used effectively in an enemy ECM environment. The AIM-7E is carried on F-4C/D/E aircraft, and an improved model, the AIM-7F, is planned for the F-15 aircraft.

Only two models of the SPARROW are in the current inventory. The existing small number of AIM-7D missiles are used only for training. The AIM-7E has been used in combat in Southeast Asia. Its "dog fight" version, the AIM-7E-2, is the only SPARROW missile currently in production.

Additional AIM-7E-2 missiles are required to replenish planned depletion of WRM stockage due to weapon system evaluation and training requirements. Our fiscal year 1971 request is for AIM-7E-2 missiles at a cost of \$14.4 million.

TARGET DRONES

Target Drones are airborne vehicles which can be used to simulate subsonic and supersonic enemy aircraft. They are used by the Air Force to develop airto-air missile tactics, to train aircrews in air-to-air missile intercepts, and to test and evaluate our aircraft and missile weapon systems. For fiscal year 1971, we are requesting \$13.7 million to procure 58 BQM-34A subsonic and 40 BQM-34F supersonic target drones.

MODIFICATIONS

Funds requested for modification of in-service missiles and updating of in-production missile systems total \$206.0 million for fiscal year 1971. Of this request, \$166.0 million is planned for the MINUTEMAN weapon system. Funds in the amount of \$69.7 million are needed to continue the MINUTEMAN Force Modernization program: \$55.8 million will procure the ground electronic systems and depot maintenance ground equipment needed to configure MINUTEMAN I silos for the MINUTEMAN II and III systems: the remaining \$13.9 million will be utilized to plan site activation, acquire technical data and purchase training equipment. Another \$96.3 million is required for improving the capabilities,

reliability and safety of the MINUTEMAN II and III weapon systems. Specifically, the funds will support: (1) the incorporation of inflight hardness methods into MINUTEMAN II missiles; (2) the incorporation of new inflight hardness criteria into previously delivered MINUTEMAN III missiles; and (3) the updating of MINUTEMAN II equipment for MINUTEMAN III use. The balance of the modification request is needed for other types of missiles: \$15.0 million will be used to provide the AIM-4D FALCON missiles with proximity fuzes and better warheads and to improve the missile's maneuverability. Another \$17.0 million will extend the entire performance envelope of the SIDEWINDER missile. Finally, \$8.0 million will be used to improve the performance, reliability and safety of other missiles in the inventory.

SPARES AND REPAIR PARTS

The fiscal year 1971 program for missile spare parts and repair parts is \$64.6 million. This amount provides support for all guided missiles in the Air Force inventory and includes both initial and replenishment parts. *Initial* spares and repair parts account for \$40.4 million. The total amount for initial spares is allocated among MINUTEMAN, \$26.2 million: SRAM, \$10.8 million; and other missiles, \$3.4 million. The "other missiles" include the air-to-air and air-to-surface missiles described earlier as well as missile which are in the inventory but no longer in production. *Replenishment* spares and repair parts requirements total \$24.2 million. Of this total, \$13.5 million is in support of the MINUTEMAN program, and \$10.7 million is for TITAN II, QUAIL, DRONES, and BOMARC, plus air-to-air and air-to-ground missiles.

INDUSTRIAL FACILITIES-MISSILE

As in the case of aircraft, the industrial facilities account includes funds to replace obsolete Government-owned machine tools and for maintenance of Air Force industrial property and equipment. It also supports the manufacturing methods program as applied to missiles.

The fiscal year 1971 budget request includes \$6.9 million for industrial facilities used in missile production. Of this request \$2.1 million is for capital-type rehabilitation of Government-owned industrial real property and equipment; \$0.8 million is for packing, crating and handling of Air Force production equipment; \$4.0 million is for the Air Force Manufacturing Methods Program.

OTHER SUPPORT EQUIPMENT

The last missile category is Other Support Equipment for which we are requesting \$664.6 million. This category includes funds for the support of operational space activity and other programs as allocated below:

	Millions
Defense communications Satellite	\$ 20.5
General purpose applications	19.2
Defense support program	98.0
Classified drones	[deleted]
Special activities	[deleted]
Total	9004.0

Fiscal year 1971 funds for the Defense Communications Satellite system are required to procure the third booster of the current three-launch program. Funds for the other activities will support our contributions to classified national programs and Air Force mission programs.

SUMMARY

In summary, the Air Force Missile Procurement program request for fiscal year 1971 totals \$1,599.5 million for the missiles and missile support essential for maintaining our military posture. MINUTEMAN requirements alone account for 42 per cent of this request.

Of the total amount, \$49.5 million will be obtained from recoupments and the available fiscal year 1970 unobligated balance. In addition, \$5.4 million in reimbursements will be applied to finance the program. The remaining \$1,544.6 million requires new obligational authority for fiscal year 1971.

General Glasser. Thank you, Mr. Chairman. We have attempted to anticipate the interests of the committee in preparation of that statement, and I believe it will stand as worthwhile backup material for the efforts of the committee.

Chairman Stennis. All right.

General Glasser. General Ferguson has been identified as being present with his key program directors to cover the major programs, being MINUTEMAN, SRAM, F-111, C-5, AWACS, F-15, A-7D,

and MAVERICK, and we will hear from him very shortly.

So far as our aircraft procurement program is concerned, it includes this year 390 aircraft of 10 different types. Of this number, only 177 aircraft are for the U.S. forces. The remaining 213 are for other nations under the military assistance service funded program. These together with the funds requested for modification, spare parts, and other support are listed in Table 1, which is a part of the statement that has been submitted.

The direct program costs of the fiscal year 1971 aircraft procurement requests total \$3.514 million. This is approximately \$1.27

billion----

Chairman Stennis. Excuse me now just a minute, General. Are you reading from your condensed statement here now?

General Glasser. I am extracting brief portions of the condensed

statement, sir.

Chairman STENNIS. Please call the page then that you are talking from.

General Glasser. I am talking from page 4 of the condensed statement.

Chairman STENNIS. Very good.

General GLASSER. The direct program cost of the fiscal year 1971 aircraft procurement request totals \$3.514 billion. This is approximately \$1.27 billion and \$440 million less than the \$4.783 billion, and \$3.954 billion program for fiscal years 1969 and 1970 respectively.

The reimbursable program is estimated at \$400 million and in addition a line item representing a \$59.4 million portion of the estimated fiscal year 1969 and prior year programs is to be reappropriated in fiscal year 1971 for a grand total current program of \$3.973 billion.

Reading then from page 11 of the condensed statement, I will next summarize the Air Force missile procurement program for fiscal year

1971.

This program is presented in table 2, and contains [deleted] strategic ballistic missiles, [deleted] strategic air-to-surface missiles [deleted] air-to-air missiles, and [deleted] SHRIKE guidance head components. It also includes funds for target drones.

The required funding for this missile procurement program is \$1.580 billion, which also includes the aerospace ground equipment

and services required to support these programs.

We anticipate a reimbursable program in fiscal year 1971 in the amount of \$5.4 million. In addition just as in the aircraft program, a line item representing a \$14 million portion of the estimated fiscal year 1969 and prior year programs is to be reappropriated in fiscal year 1971. This will bring the total program to \$1.599 billion.

Mr. Chairman, with this brief summary, I would suggest we hear General Ferguson's statement prior to responding to your questions.

PREPARED STATEMENT OF GENERAL FERGUSON ON SYSTEM DEVELOPMENT AND ACQUISITION PROGRAMS

Chairman STENNIS. General Ferguson we will place your statement in the record.

(The statement follows:)

Mr. Chairman and members of the Committee: It is a privilege to meet with you today to present the major Air Force system development and acquisition programs. Joining with me will be the Air Force Program Directors for these programs. I propose to furnish an overview of each of the programs, after which the Program Directors and I will be happy to respond to your questions or provide whatever additional information you desire.

Before getting down to specific programs, however, I would like to examine with you the backdrop against which they are being carried out. The Air Force is acutely concerned with the need for maximum efficiency in the acquisition of weapon systems, and particularly so in this era of diminishing resources in

which there is a high premium on improved management.

I would like to discuss briefly the Air Force's quest for ways and means to improve the management of this major portion of the budget and in turn our national resources. These efforts, I might add, have been evolving for some years; but we have stressed them with added urgency and emphasis this past year.

MANAGEMENT AND ORGANIZATION STRUCTURE

The "system" concept, in which a weapon is recognized as an extremely complex grouping of hardware, software, people, and facilities, was pioneered by the Air Force in the 1950s in order to obviate the problems that arise when each element is separately treated. This "system management" approach is now employed widely in the Department of Defense as the preferred method for planning, managing and executing major system development and acquisition programs.

At the heart of this way of doing business is the principle of decentralization of management. Therefore, the System Program Office (SPO) was developed as the principal unit for the management of any major program; the System Program Director (SPD) is the Chief of the Program Office, and is, in fact, the

program manager.

The Air Force Systems Command was established in 1961; thus, for the first time in the Air Force, the total mission of advancing technology, planning and advocating new programs, and developing and acquiring those that were approved,

was encompassed within a single organization.

The Year 1961 was also the time when a new Secretary of Defense looked into the thicket of proliferating weapon choices made possible by exploding technology and the considerable costs of the numerous alternatives. He saw a need for tightened control at the very top, and management as a result became very highly centralized. This centralization of decision-making brought with it the need for massive amounts of detailed information, and more and more technical people to interpret that information, in the Pentagon—both within the Office of the Secretary of Defense and on the Air Staff. What naturally happened, then, was that AFSC still had the heavy mantle of responsibility for systems acquisition in the Air Force, but a very small remnant of actual authority.

The last year, of course, has seen a reversal of the trend. The Administration has set the tone and furnished the policy framework for a swing back to decentralized management, with responsibility pinpointed and the matching authority delegated to those who are held accountable for results. The Secretary and Deputy Secretary of Defense have acted vigorously to put the "new look" into

action.

The Secretary of the Air Force, the Chief of Staff and I are strongly supporting this return to management fundamentals. We in Systems Command are beginning to play our proper role in the management of approved programs—the role that caused the Command to be created in the first place. The Secretary and the Chief hold me directly accountable for Air Force Systems development and acquisition; and I, in turn, hold the System Program Directors accountable for their respective programs.

To translate the new policy into action, the Air Force has been realigning certain organizational responsibilities in the program management area. The effect has been to streamline our management structure and eliminate unnecessary briefing and reporting. As of last July, for example, the new F-15 aircraft program came under the direct management control of Air Force Systems Command. Consequently, most of the Air Staff personnel assigned to this program have been transferred to my Headquarters at Andrews Air Force Base. The Air Staff monitors our management and program progress, participates in major program decisions and by their planning efforts formulate overall Air Force objectives and system requirements.

The same, or a similar, type of streamlined structure and alignment of responsibilities has also been applied to the Minuteman, F-111, and one of our space programs, and we are considering this sort of framework for the B-1 advanced bomber program. We also intend to follow this course for selected major programs of the future, once they have been approved for development and

acquisition.

CURRENT MANAGEMENT EMPHASIS

In the evolution of our management concept for systems acquisition, we have made cost and schedule equal in importance to technical performance, except when overriding factors dictate otherwise. The management control process has been built around these three variables and their interrelationships. And yet, as we all know too well, the record over the past decade shows that some systems still cost substantially more than predicted; schedules are still delayed; and technical performance is still sometimes less than planned.

During this past year, we have been concentrating on identifying and analyzing the causes for not achieving cost, schedule, and performance objectives so that we could strengthen our management procedures and techniques where necessary. We are well aware that cost growth—the difference between the pre-stated cost estimate and actual cost—is the most highly publicized management problem in the acquisition of weapon systems. Extensive analyses conducted by various organizations both within and outside the Government show that program cost growth can be traced to four basic conditions, any or all of which may be present in a given program. These are:

Optimism in early cost estimates by the military services and the contractors. Program changes during the development and acquisition phases—caused by changes in threat, strategy, requirements, technology, or economics.

Unidentified risks revealed in the development program.

Inflation—for example, if you consider a 4% inflation rate on a program spread over eight years, using "then year" dollars, you can expect a cost growth of approximately 20% due to the effect of inflation alone.

Our current improvement efforts are designed to minimize the problem of cost growth in the future, but I cannot in all honesty promise that a precise match can be achieved between actual costs and the initial estimates made early in the planning phase of a weapon system. If it won't work out for straightforward civil-sector programs like the Kennedy Center for the Performing Arts, which has encountered a 33% cost growth so far, and the Federal Interstate Highway System, which was originally estimated to cost \$27 billion, but now is estimated to cost \$70 billion, it is less likely when we are working at the frontiers of technology—contracting, in effect, for the uncertain, if not the unknown.

This should become more clear when we get into each of our major Air Force systems and the various events and circumstances that altered the original cost estimates, and other reasons for cost variations.

In the area of schedules, past troubles have come up in two ways:

First, budget fluctuations force changes in procurement schedules, as, for example, in the case of the F-111 Program. Configurations and quantities to be purchased have been changed so often as to increase the cost substantially.

Second, unrealistic self-imposed schedules. In some cases schedules were considered inviolate when they should not have been. As a result, movement from development into production was perhaps too hasty. In other cases, after an avalanche of paper studies, we were stampeded into contract definition just to finally get going. The full effect of these decisions, of course, only comes into clear focus after the fact.

In our improvement program we are placing special emphasis on techniques for assuring that schedules are more realistic to begin with. For one thing, there will be less emphasis on concurrency and more time between development and production. The trend is very much toward more conservative schedules.

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The third trouble area has been technical performance. This is an especially difficult area for management, both in system definition and in the actual development and acquisition, because it involves the performance characteristics required for successful military mission accomplishments. Ideally, the system performance characteristics should represent an optimum balance between the military need and technological feasibility. In practice, of course, this is far more easily stated than achieved.

With the benefit of hindsight, I am sure some systems can be found in which operational performance objectives were changed and they, in turn, forced costly changes in the program. Or others that are encumbered with expensive features

that do not materially improve the military utility of the weapon.

Truly, foresight never sees as clearly as hindsight; but I assure you that we are introducing new techniques to reduce the gap between them. For example, we are placing special emphasis on relating cost sensitivity to specified performance and military need. We are also fully aware that the cost of the last few per cent of performance is sometimes very high in relation to military value. We are, therefore, challenging operational requirements which attempt to squeeze the last ounce of technology and increase risk and cost for relatively little return in maximum performance. Three examples come to mind. A landing distance requirement of 2800 feet vs. 3500 feet involves flaps, brakes, and high lift devices; a requirement for supersonic vs. sub-sonic sustained low altitude speed has a direct bearing on design complexity, gross weight, and cost; restudy of the specified range of a new air to air radar has enabled us to reduce appreciably the range and still have a design compatible with the characteristics of the on-board weapons and the target aircraft. Thus, you see, we are making every effort to be more realistic in the establishment of our system requirements.

As a result of these analyses of past troubles in the areas of cost, schedule and performance, we have altered our management approach to stress balance. I hold the Program Director responsible for maintaining the proper balance among cost, schedule and performance. At the same time, we are broadening our management structure to allow for more active participation of the using commands in trade-off analyses, as well as in formulating recommendations to our decision and policy-making authorities.

In sum, our current emphasis, then, is bearing down hard on improved management of systems through: a streamlined management structure, with unnecessary levels and layers eliminated; a return to the fundamentals of sound management; and better balancing of cost, schedule and performance.

NEW PROCEDURES AND MANAGEMENT TECHNIQUES

Let me explain in more detail some of these new procedures and management techniques, which we have adopted in close coordination with the Office of the Secretary of Defense, the Secretary of the Air Force and his assistants, the Air Staff, and the other major Air Force commands.

The most important, to my mind, is a program to improve our Air Force cost estimating and cost analysis capabilities. We are designing procedures to assure that program estimates are as realistic as possible. As Secretary Seamans pointed out in his statement, we are also revising our budget procedures to provide for the "most probable" system cost, rather than the "target" costs which have tended heretofore to be on the optimistic side. In order to trace program cost in a more systematic way, I have directed each Program Director to maintain a "cost trace" on his program. The cost trace which is in effect a cost history for the system includes baseline program information such as the government cost estimate prior to contract award, specifications, deployment rates and initial operational capability date, as well as all program changes increasing or decreasing costs. This cost information, in summary form, is available to the Congress in the Selected Acquisition Reports (SAR).

Since most engineering changes in development and acquisition programs have a powerful impact on costs, we are also putting increased emphasis on configuration management. Our newly established procedures provide that the Program Director must chair the System Configuration Board and that he personally must approve the need for a letter contract. In addition, we have provided that all change orders must include a "not to exceed" cost agreement with the contractor, and that only the Program Director can approve changes over \$25,000. We have also implemented new DOD configuration management policies and procedures based on practices initiated originally in the Air Force. As a result,

industry will now be able to respond to a single DOD Configuration Management System instead of to three separate and divergent service approaches.

Another important area, one in which we are starting to see a pay-off from our efforts of the past several years, is the implementation of the Cost/Schedule and Control System Criteria relating to our contractor's internal management systems. This specification establishes criteria that the contractor's internal management control system must satisfy in managing and controlling costs and schedules. This approach does not tell the contractor how to manage and control contract costs, but merely establishes the criteria he must satisfy. I strongly support the criteria approach and am pleased to report that it is now incorporated into Requests for Proposals and contracts for programs which are anticipated to cost \$25 million in R&D funds or \$100 million in production funds. We have conducted 26 demonstrations against the criteria; seven contractors' systems have been approved, and we expect another five to be approved by the end of the fiscal year.

To complement the cost and schedule elements of performance measurement, we are in the midst of another effort; the purpose of which is to measure the technical performance of a system and its elements. Again, using the contract specification approach, we have developed a Military Standard for Systems Engineering; this standard has already been incorporated into the F-15 contract. In effect, our goal is to emphasize that acceptable engineering standards are applied in the measurement of system performance. The contractor is not rigidly required to use dictated procedures; the specification states the requirement and provides the criteria, and the contractor is free to choose his own procedures

for meeting them.

We are also devoting a great deal of effort to improving our procurement procedures to recognize the difference between development and production. For example, we are adopting what I believe is a more realistic contracting approach by properly tailoring each contract to the unique nature of the system being procured. Thus, the F-15 contract is Cost-Plus-Incentive-Fee (CPIF) for the development and engineering phases, and Fixed-Price-Incentive-Successive Targets (FPIS) for the production phase. We will be adopting the same flexible concept to the B-1 bomber.

Another procurement technique we are adopting entails maintaining competition for a longer duration, as a means of improving quality and holding down price. As an example, we recently asked eleven companies to submit proposals, at their expense, for a new air-to-air missile, the AIM-82. From their responses, we plan to select three contractors who will accomplish system definition. Upon completion of the system definition and approval by the Secretary of Defense, a two-contractor competitive development fly-off will be initiated. Award of the production contract will be based primarily on the performance demonstrated during the fly-off.

Finally, we have implemented new procedures to provide top management with timely and appropriate program status information. These provide for indepth Air Force executive reviews of our major development and acquisition programs on a monthly and quarterly basis. The basic objective is to permit top management to zero in on emerging problems as soon as they first surface, so

that they can be resolved in an orderly manner.

These reviews have strengthened our management control; they likewise provide the basis for the Air Force submission of the Selected Acquisition Reports to OSD and to Congress. As with any new system, the initial SAR reports had certain deficiencies; we have identified them; we have learned from them; and we are working hard to correct them.

It is gratifying to me personally that AFSC has taken the lead in many of these innovative efforts and that many of them have been adopted by OSD for imple-

mentation throughout the Department of Defense.

OPPORTUNITY FOR BETTER DEFENSE PLANNING

Before turning to a discussion of our major Air Force programs, let me assure you that we are keenly aware of our responsibilities for preserving and maintaining the national security within the resources the nation can allocate to develop and produce new weapon systems.

We recognize that, under budgetary constraints, our approach to military requirements must be based on a more comprehensive understanding of the technology involved and the state-of-the-art available. We must, in other words,

have better estimates of the technical risks versus performance requirements, costs, and delivery dates.

Technical risk is a function of the state of technology. So we all need to remember that future systems grow out of current technology and that technological superiority requires a continuous, adequately funded research and development program. If, in saving relatively small amounts by cutting back on R. & D. we degrade the level of our technology, then we do indeed invite greater technical risk on later programs. Then, not only do we end up with increased costs and delayed schedules, but we also face the graver risk of technological surprise by an enemy, and all the attendant danger.

I am confident that further improvements can be gained through more realistic development schedules. These can be achieved through a better balance as between analytical studies, prototype development, and advanced development of components in areas where technical risk is high. We must also establish definitive decision milestones that provide for meaningful assessments of the technical progress of the programs as compared to planned schedules and costs.

Lastly, I earnestly urge the support of the Congress in helping to improve the stability of all approved programs. Frankly, I wish we could find a rocket motor that we could stop and start, speed up and slow down as frequently and as quickly as some of our programs. Program stretch-outs, cut-backs and delays while they may sometimes solve near-term problems, to often generate long-term cost growth problems that are irreversible. For example, as you will see when we get into the F-111 Program in detail, the quantities to be bought and the production schedules for this program have changed drastically since 1964; and as a result we have experienced substantial cost growth. In 1964, we had an approved "buy" of 2.411 Air Force and Navy models; today, we have a 529 aircraft program spread over six different models. So we do, I say, very much need your help and understanding in this area.

We in the Air Force will continue to seek ways to improve the acquisition and managment of weapons systems needed for the national security. I am confident we are making real progress, and I believe the efforts we now have under way will result in further management gains in the years ahead.

MAJOR AIR FORCE PROGRAMS IN DEVELOPMENT AND ACQUISITION

That completes my remarks with respect to the Air Force's efforts to improve the management of systems acquisition. I would like now to discuss with you the following major Air Force programs currently in development or acquisition: MINUTEMAN, SRAM, F-111, C-5, AWACS, F-15, A-7D and MAVERICK.

You are aware, I believe, that the Program Directors appeared before various ad hoc subcommittees to present and explain the status of these programs. In addition, Secretary Seamans, General Ryan, and General Glasser have testified on the proposed Air Force Fiscal Year 1971 program for each of these and various other systems. My remarks will, therefore, be limited to a general overview of each program; thereafter, each System Program Director will be available to discuss his particular program in terms of the Selected Acquisition Reports and in whatever detail you may wish.

The first program is:

MINUTEMAN PROGRAM

MINUTEMAN is the primary operational missile system in the United States strategic force structure today. Because of its importance to our Nation's defense, it can be characterized as a system that has been driven—and constrained by—a high national priority, a constantly changing enemy threat, rapidly improving technology, and generally compressed development and production goals.

The MINUTEMAN program is now twelve years old and throughout its rather lengthy history, MINUTEMAN has undergone many changes and improvements. The operational force now contains 500 MINUTEMAN I and 500 MINUTEMAN II missiles. MINUTEMAN II is a much more flexible system than MINUTEMAN I. MINUTEMAN III, which will soon enter the operational inventory is an improved weapon system over MINUTEMAN I and II. Certainly, the MINUTEMAN program is a good example of an evolving weapon which has been suited for the strategic offensive needs of the Nation over a considerable period of time. As strategic thinking change, MINUTEMAN has adapted.

MINUTEMAN is an expensive program from the standpoint of the national resources it consumes. Appropriations to date—through FY 1970—total \$13 billion. To complete the program, as currently projected, we estimate another \$4 billion ultimately will be required.

Before reviewing our current MINUTEMAN program activity—and how we manage the system within AFSC—let me briefly review the entire program in

order to place today's efforts in their proper perspective.

The basic objective of MINUTEMAN I was the development of a weapon system capable of destroying enemy industrial centers and other soft targets with a high degree of reliability. Because of the alarming estimates of Soviet ICBM deployment in the late 1950s (the "missile gap" era), an accelerated development program was approved in May 1959 which called for an initial operational capability (IOC) in July 1962—approximately one year earlier than previously planned. As confidence in the reliability of the system increased, the MINUTEMAN force structure was increased from an initial planned force of 400 missiles to one of 800 missiles. During this development period, MINUTEMAN I was continually undergoing improvement.

Our estimate of the Soviet threat was changing and our original concept of instantaneous massive retaliation was changing to a national strategy which emphasized a more controlled response. Consequently, MINUTEMAN was called upon to respond to a multitude of new situations beyond its original capabilities. The requirement to meet these new conditions established one prime system

objective-flexibility.

MINUTEMAN II provided this flexibility by increased warhead weight, improving target accuracy, i.e., Circular Error Probability (CEP), and increased target selection capability. MINUTEMAN II became operational in late 1965, and deployment was completed in early 1967, bringing our total force to 1,000 missiles. The last of 500 operational missiles was deployed in June 1969. As the program evolved, additional capabilities have been developed. A retrofit program is now underway to increase the post-launch survivability of the missile by hardening the guidance and control system. Additionally, we are developing a penetration aid system.

Our test programs have been laid out to provide a high confidence in system reliability to insure no degradation to the missile with the passage of time. Though there have been failures, the overall MINUTEMAN II R&D flight test program has been very successful.

While MINUTEMAN II was a significant improvement over MINUTEMAN I, its growth potential was also limited. Developments in the Soviet Union clearly

indicated the need for an improved strategic missile system.

In the spring of 1966, development of MINUTEMAN III was authorized. This system provides a major improvement in capability over MINUTEMAN I and II. It provides an improved guidance and control system; and its improved third stage provides additional throw weight to carry the MK-12 reentry system. The MK-12 system with its Multiple Independently-Targetable Re-entry Vehicle (MIRV) and penetration aid capability will greatly enhance MINUTEMAN III's effectiveness against the Soviet ABM defenses. Additionally, the number of warheads is increased without increasing the number of missiles in the force.

Initial planning called for MINUTEMAN III to become operational in July 1969. As a result of re-examining the potential threat and funding limitations, this date was slipped. General Ryan has described the long-range planning which calls for 500 MINUTEMAN III missiles to replace all 500 MINUTEMAN I

missiles by the end of calendar year 1974.

The first flight of MINUTEMAN III was achieved in August 1968—and was a complete success. Later tests have revealed some problem areas, but the overall R&D flight test program is progressing satisfactorily. Tests to date have been highly successful in demonstrating the improved third stage and establishing the technical feasibility of the MK-12 MIRV concept. Future test milestones include several operational tests and test of different source guidance systems, they will give high confidence in MINUTEMAN III as it becomes operational.

The basic philosophy under which our major programs are managed has been generally described. The MINUTEMAN System Program Office (SPO)—under the direction of Major General Schultz, the System Program Director (SPD)—is located at the Space and Missile System Organization, Los Angeles, California. The MINUTEMAN SPO differs from other SPOs in several ways. First, there is the magnitude of the funds managed by the office—for the past several

years, the funding level of the program has been approximately one billion dollars per year. On most of our major programs, we have a prime contractor to integrate the efforts of many subcontractors in system development and acquisition. This is not the case with MINUTEMAN; the System Program Office functions as the integrating agency for a number of associate contractors. On MINUTEMAN III, for example, the Boeing Company, Thiokol Chemical Corporation, Aerojet General Corporation, Autonetics, General Electric Company, Bell Aerosystems Corporation and Honeywell, Inc. are major associate contractors. The SPO is responsible for effectively integrating the efforts of this large Air Force contractor team dedicated to the development and acquisition of the MINUTEMAN program.

Cost growth in this program can be related to changes in enemy threat, national policy and advancements in technology. Prime examples are the changes that have already been noted such as the improvements between MINUTEMAN I, II and III, the inclusion of penetration aids and the very sophisticated

MIRV concept on MINUTEMAN III.

For the fiscal year 1971 R&D program we are requesting a total of \$224.2 million for MINUTEMAN (\$38.8 million for MINUTEMAN II: \$185.4 million for MINUTEMAN III). For MINUTEMAN II, the \$38.8 million is needed for further in-place and in-flight hardness testing, operational base launch and other support. The \$185.4 million for MINUTEMAN III is needed for systems integration and test, guidance and control improvements, post-boost propulsion system testing, in-flight hardness testing, the MK-12, development of a capability to test launch a missile from an operational silo and other support.

The procurement program we are requesting for FY-71 includes funds for procurement of MINUTEMAN III missless and their related ground equipment, data and site activation, initiation of force modernization, initiation of the Operational Launch Program and continuation of the hardness retrofit of

MINUTEMAN II.

The level of funding requested for fiscal year 1971 will allow us to meet the currently planned MINUTEMAN III deployment schedule.

The MINUTEMAN Program Director is Major General Kenneth W. Schultz.

AGM-69A SHORT RANGE ATTACK MISSILE SRAM

The need exists for a Short Range Attack Missile to provide our Strategic Forces the capability to defeat terminal bomber defenses. The Intelligence Community estimates that the Soviets will place primary emphasis on defense of their key cities utilizing Surface-to-Air Missiles (SAM's). Many sites are considered operational now. Deployment of this system is expected to continue until at least 1972.

To further improve their low altitude Surface-to-Air Missile (SAM) capability, the Soviets would probably have to develop and deploy a new system specifically tailored to this purpose. Such a system is projected in the mid to late 1970%

The AGM-69A (SRAM) is an air launched missile with nuclear warhead. The missile guidance system is inertial. The propulsion system is a two pulse solid rocket motor, with a programmable, variable interpulse time delay. The new radar reflectivity of the missile strongly enhances its penetration capability with minimal chance of detection and when coupled with a high speed presents to the defender a threat that is significantly different from the ballistic re-entry vehicle threat.

Historically speaking, the SRAM development program was approved in March 1965, following more than two years of studies, definition, and formulation efforts.

During the period between program approval and contract award to Boeing, Seattle, on 1 November 1966, numerous changes in missile and carrier aircraft requirements and capabilities were directed. Concurrent development of the missile, the FB-111 and the Mark II avionics system greatly contributed to the complexity of the program.

A development contract with production options was directed for SRAM after extended discussion during January-July 1965. The original contract was a definitive, fixed-price incentve type (with a development target price of \$143. M), pricing formula provided an 80/20 sharing ratio, 10% target profit and 130% celling price. A performance incentive on radar cross section and a value engineering clause were included.

The scope of work included design, development, test, and evaluation of the missile, support equipment, technical data, engineering and equipment to fit SRAM to the FB-111 and B-52 G&H, and modification. The government was committed to provide test aircraft (FB-111 and B-52) and specified equipment, data, and services.

Design and development of SRAM has been strongly affected by numerous changes in interface criteria between the missile, its carrier aircraft, and its warhead. Additionally, the technical problems associated with solid rocket motor development and availability of government furnished property (FB-111 test aircraft) have each in their own way, produced an interlaced impact on orderly completion of the development effort. As a consequence of these influences, delays have been incurred and costs have grown over original estimates.

The Air Force has maintained a Development Cost Estimate Track throughout the life of this program. Total Research, Development, Test and Evaluation (RDT&E) estimates have increased and are duly recorded in AGM-69A Selected

Acquisition Reports (SARs).

By reason of concern over technical problems primarily associated with motor development, the production options were not exercised in April 1969 and the current SRAM contract is for development only, having a definitized price of \$153.0M. Intensive negotiation on a principal contract proposal (CP 175), consolidating the effects of many individual changes to the original contract, has been underway since April 1969. While agreement between the two parties on many points (technical baseline and contract terms and conditions), agreement

has not been reached on price of this omnibus proposal.

Boeing has presented a claim (\$54M) against the government on behalf of itself and Lockheed, its propulsion subcontractor, asserting that rocket motor performance specified in the original contract was beyond the state-of-the-art. Contentions are that the Air Force has some responsibility for the situation and that the necessary, costly research and experimental work was beyond the scope of the contract. After review of the claim and supporting documentation, Boeing was advised on 28 January 1970 that proper justification had not been established for a valid claim against the Government. Boeing was given the opportunity to submit additional justification if it chose to do. The SRAM program today has been under development forty months. The development test effort is nearing completion and emphasis has shifted to flight testing at Holloman AFB. New Mexico. Numerous accomplishments have been made in the B-52 and FB-111 Category I Flight Test Program. Some of these include missile captive flights for aerodynamics and avionics checkout, dummy missile separations from internal and external carriage positions (both subsonic and super sonic), and most important-actual launches of flight test missiles over the White Sands Missile Range.

To date, there have been five live launches from the B-52 aircraft (29 July 1969, 16 October 1969, 11, 18 and 25 February 1970). Although minor problems were associated with the first and third launches, for the most part all primary objectives were satisfactorily achieved. The second, fourth and fifth missile flight test launches satisfied all test objectives. The missiles closely followed planned flight paths, completed planned trajectories, impacting in the target area. Missile range and speed performance exceeded predicted values for the tests.

The pace of flight test activity will increase considerably in the months ahead. Present schedules call for a total of 7 missile flights from the B-52 and 4 missile flights from the FB-111 by 1 May 1970. When these are accomplished all missile trajectories will have been demonstrated from each launch aircraft.

By 1 June 1970 we will have added two more flights from the B-52 and two from the FB-111. Category I flight test on the B-52 will thus be completed.

By 1 July 1970 a total of 11 missile flights from the B-52 and 7 from the FB-111 will have been conducted.

Current plans call for all remaining Category I and II test launches to be completed by the third quarter of FY 1971. Forty-one total launches are planned. Any delays experienced in the test program will cause a larger percent of the total remaining (36 launches) to occur in the 1971 time period. If schedules are maintained, the bulk of the R.D.T. & E. effort on SRAM will have been accomplished by the end of FY 1971.

Present production planning is based on utilizing FY 70 funds to provide long lead procurement, tooling, and production planning in support of the FY 71 production program. The FY 71 program will buy the necessary increment of

missiles and Aerospace Ground Equipment (AGE) for the initial FB-111 and B-52 squadrons. Procurement of Group A and B equipments for B-52 aircraft and Group B equipments for FB-111 aircraft are also included in the FY 71 production program. Clearly, the production decision is dependent on continued success in the development flight test effort and on timely release of funds to support the planned production program.

SRAM program management is assigned to the Aeronautical Systems Division at Wright-Patterson AFB, Ohio. Colonel D. M. Falk is the System Program

Director.

F-111 PROGRAM

I would now like to turn to the F-111 Program. The Committee's familiarity with this program together with the broad scope of today's subjects obviates, I believe, the need for a detailed treatment of this complex program. Therefore, with your permission, Mr. Chairman, I will restrict my remarks to a summary discussion of the Air Force's original and present requirement for the F-111, the factors that have driven the unit flyaway cost of the weapon system upward, the degree of severity and abnormality of the program's development difficulties and, finally, the required F-111 force structure posture.

Requirement

Exacting analyses performed in 1959 and 1960 of our own and our potential enemies' capabilities for the future revealed that: first, our need for a strong tactical interdiction capability, in both general and limited wars, was becoming more vital: secondly, our existing and planned tactical weapon systems' precision bombing capabilities were limited. Perhaps most important of all, our adversaries' air defense capabilities were rapidly developing to the point that very advanced attack characteristics were required to successfully strike interdiction targets with acceptable survivability. The conclusions projected in these analyses have proven to be very accurate. The Air Force's F-111A was conceived to fill this requirement and, together with the F-111D, E, and F tactical models, has developed into the best weapon system for this purpose.

In the early stages of the TFX program, a great deal of industry, OSD, and Air Force enthusiasm developed over the versatility of the variable sweep wing design and the multi-purpose mission potential of this aircraft system. Even though the overriding design requirement favored a nuclear, tactical interdiction, supersonic, low altitude, strike mission, a strong need was recognized for an aircraft that could perform non-nuclear, interdiction, and close air support missions as well as theatre air defense, intercept, (air-to-air) mission. This multi-mission evolution was exemplified by the inclusion of the Navy F-111B in the program. The F-111B was conceived as a comparatively minor variation to the basic F-111A for use in the fleet air defense role.

Unit Flyaway Cost Escalation

Based upon this multi-mission potential, the aircraft was regarded as the future backbone of our tactical strike forces. Accordingly, in March 1964, a combined total of 2,411 of the Air Force and Navy models were approved for procurement. I wish to emphasize, Mr. Chairman, that the aircraft unit flyaway cost figures so often referenced in regard to the program's cost growth were based upon this large procurement of essentially two models of the aircraft. Technical difficulties and fiscal constraints subsequently forced program stretchouts as well as a series of quantity reductions which, coupled with cancellations of the Navy F-111B and United Kingdom F-111K, leave us today with an aircraft program buy composed of six different models. The Air Force obtained added capabilities in these different models at the expense of adding significantly to the program's cost growth. Program costs have also risen because of technical problems and escalation of the dollar. However, the biggest single cause of the increase in unit flyaway cost has been caused by the decrease in the total quantity procured and the extended time frame in which the remaining aircraft were to be produced. For these reasons, we have seen the estimated average unit flyaway cost rise from \$2.8M to just over eight million. Coincidentally, the earlier trend toward development of a multi-mission joint service aircraft has reversed itself. Because of the F-111's unique capabilities, it will probably be employed almost exclusively in that role; this is particularly so in light of the pressing need for those capabilities and the limited numbers of F-111's being produced for our tactical forces. Hence, the greatly reduced production buy together with the cancellation of the Navy F-111B have, in effect, relegated the

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F-111 to a special purpose, deep interdiction and attack weapon system. The sole exception to this generality is the FB-111 strategic bomber version. The first of the total 76 FB-111 force has been delivered to the Strategic Air Command. Our current assessment is that this aircraft will be a very important addition to the strategic forces.

Development Difficulties

The program's technical problems have been publicized to such an extent that the term "trouble ridden" seems to have become synonymous with the F-111. I think it is important that the record be set straight on this point. We, in the Air Force Systems Command, are accustomed to problems in the development of new weapon systems. The F-111 has encountered problems no more numerous and no more severe than have other weapons systems. Perhaps it has had even fewer difficulties than its predecessors when one considers its advanced capabilities and its complexity. The unusual degree of public interest in the F-111 program has tended to becloud this point. With your permission, I will briefly review some of these development problems. First, the weight growth of the airplane. There has yet to be an aircraft developed which did not become significantly heavier than anticipated in the initial design. In fact, weight control is such a difficult problem that unusual program management measures are normally required to deal with weight growth. One such control which the Air Force often uses is to specify contractually what the aircraft will weigh. This was done in the F-111 program. However, this contractual weight specification has come to be considered as an absolute requirement rather than as the weight minimizing incentive that was intended.

Another development problem involved matching of the aircraft engine and its air inlet. This difficulty became apparent shortly after the first flights in early 1965. Many of our fighters have encountered this type of problem because we strive for high performance engine designs and great aircraft maneuverability at high altitudes and airspeeds. These conditions demand very smooth air flow in engine inlet. However, it was not fully realized how critical the inlet air flow had to be until the engine stall problem arose on the TF-30 by-pass engine with its multistage afterburner. Normally, a smooth inlet air flow is easily provided by comparatively large area inlets having rounded cow lips. However, it was thought that this type of inlet would not be necessary on the F-111, because of the range penalties that would result at the very low altitudes and supersonic speeds required for the interdiction mission. The initial inlet design was tailored to the high speed low altitude requirement. As has been necessary on many previous fighters, the F-111s inlets have since been redesigned to accommodate the air flow requirements of this advanced engine design and now provide satisfactory operating characteristics at both high and low altitude flight conditions.

The next problem I will touch on had a very simple technical solution. Before we solved it though, it did cause the loss of one aircraft. I refer to the horizontal tail actuator connecting linkage that separated resulting in loss of control of the aircraft. We found that a weld, intended to prevent a threaded shaft from unscrewing from its mating part, had failed because of locally high vibration. The solution was simply to make this two-piece part into single piece unit. This change has been incorporated into all F-111s.

The F-111 structural development program has attracted a greal deal of attention. A point that should be emphasized in this regard is that ground test structural failures are normal events. Secondly, severe structural specifications have been imposed contractually so that we can get an aircraft capable of giving us the performance we seek. The wing carry-through structure has failed on four different occasions during ground tests. Three of the four were fatigue or cyclically loaded failures as distinguished from the earlier static strength failure which occurred when forces above the design limit load were applied. The important thing to note about these failures is that they all occurred in ground tests designed to test the structure to failure; that is, to probe for weaknesses in the structure. The cause of each of these failures has been carefully evaluated and corrected. Tests are underway at this time on the reconfigured structure. Significantly, static test failures of this type have occurred in past programs, such as the B-52, and will likely occur in future programs.

Finally, I would like to address the current problem which caused the 22 December 1969 accident at Nellis Air Force Base, Nevada. As you know, we have grounded the F-111s as a precautionary measure until we have completed our review. There existed a flaw that weakened the structure in that area to the extent that the wing failed during the high "G" pullout from a drive maneuver

that was being performed. No structural changes will be required to correct this problem. Rather, new sonic reflection-type inspection techniques have been developed in addition to improvements in existing x-ray techniques. Both will be used to inspect all of the F-111s. These inspections, coupled with a static proof test program are to insure no other aircraft have similar flaws. This course of action is ultra-conservative and is being pursued even though our structural designers and metallurgists postulate with high confidence that the probability of existence of another such flaw in an F-111 is extremely remote.

This problem, like the others I have discussed, is not unique or mysterious in aircraft development programs. Demands for higher and higher aircraft performance have forced both the commercial and military aircraft designers to develop and employ higher strength materials. Each new material or new alloy of an existing material invariably has a few unique characteristics which must be ferreted out and understood. The exhaustive inspection techniques previously used in the manufacture of the part that failed did not disclose the presence of this particular flaw. The newly developed inspection techniques will positively detect them.

Required F-111 force structure

As I discussed earlier, the Air Force regards the need for the F-111s unique capabilities to be a very pressing requirement. Our fiscal year 1971 appropriation request includes funding sufficient dollars for F-111Fs to finish equipping the fourth F-111 wing. This number will also complete the F-111 production program. We currently plan to reduce from this quantity of aircraft the number necessary to pay for the structural inspection of the F-111 fleet I discussed earlier. If our appropriations request is not favorably considered and, in turn, we are unable to procure the bulk of the aircraft.

The F-111 Program Director is Brigadier General Alfred L. Esposito.

C-5A

Program Background

The development and production of the C-5A heavy logistic transport began on 1 October 1965. At that time, the program approved by OSD was for 120 aircraft to equip a six squadron force. Procurement was to be in three increments, 58 in Production Run A, 57 in Production Run B, and 5 in Production Run C.

In November 1969, the Air Force picked up its option for only part of Production Run B: that is, it authorized the procurement of 23 aircraft, rather than 57. This quantity gives us the present planned total procurement of 81 aircraft versus 120, and four squadrons, rather than six.

Current Aircraft Status

As of 19 February 1970, 13 aircraft have been built. Of these, the Air Force has accepted 6; 2 are in preparation for acceptance and Lockheed retains 5 for flight test. Of the 6 aircraft accepted by the Air Force, 3 are in flight test and 3 have been delivered to the Military Airlift Command (MAC) for training. Identifiable major assemblies and sub-assemblies have been completed through aircraft No. 40.

Technical Development Status

As in the case with the development of any new aircraft and particularly with the largest one ever built, we have encountered the usual array of technical problems that have been revealed during testing. These problems are not unique nor insurmountable, and are in the process of being resolved.

The two most serious engineering problems we have encountered are the wing structure crack and a multi-mode radar reliability and antenna pattern deficiencies. During testing of the static test article and flight testing of the structural demonstration airplane, wing cracks developed in both, in the same general area. Extensive engineering analysis and test showed why the cracks occurred and a relatively modest structural beefed-up modification is now being incorporated in all aircraft. In light of the rather dramatic publicity given the wing crack, I would like to emphasize that the C-5A was safe to fly even with the crack, due to its fail-safe construction. This explains why we did not ground the test and training aircraft for safety-of-flight reasons. The wing flx is being incorporated by a retrofit kit for airplanes Nos. 1 through 13 (completion Oct. 70) and during the production process for airplane No. 14 (May 70) and on.

With regard to the multi-mode radar, we have experienced lower than desired reliability and antenna pattern deficiencies that have prevented continuous ground mapping from directly under the aircraft out to maximum line of sight range. Aggressive action is under way to resolve these shortcomings. A proposed for the radar pattern deficiencies has been devised and is now being tested. If this fix proves satisfactory, it will be incorporated in production. If unsatisfactory, redesign of the antenna will be required. Redesign of the antenna, incidentally, is under way in the event the proposed fix does not work.

We are highly confident at this time that the C-5A will generally meet or

exceed all operational requirements.

Some examples of its demonstrated performance compared to required performance are:

	Required	Demonstrated
Maximum gross weight takeoff	764 500 lbs	798 200 lbs
Maximum speed	764,500 lbs (0.767 Mach at cruise) 8,000 ft 4,000 ft	0.90 Mach.
akeoff distance	8.000 ft	7.860 ft.
anding distance.	4,000 ft	2,710 ft.

Additionally, it is interesting to note that the C-5A is the first transport ever to receive in-flight refueling. A total of 100,000 pounds of fuel was transferred from a tanker during a single hook-up on 1 September 1969.

Production Schedule

The present contract schedule calls for an Initial Operational Capability (IOC. when the first Operational squadron receives at least eight of its 16 airplanes) of

December 1969 and delivery of the 81st airplane in January 1972.

Since this IOC was not met, and it is highly improbable that the January 1972 end date will be met, the Air Force is considering a more realistic schedule which would put IOC in September 1970 (a nine month slip) and delivery of the S1st airplane in July 1972. We understand that Lockheed is planning to propose a more conservative delivery rate of two aircraft per month (versus our three per month proposed) that would put delivery of the S1st airplane in February 1973.

	Million#
Lockheed	\$2, 916
GE	647
Air Force adds	
Initial spares	429
Construction	18
-	
Total	4, 310

Fiscal Year 1971 Funding Requirement

\$11.6M is required to complete the R&D portion of the C-5A Program. Though procurement of the 81 aircraft has been authorized by FY 1970 and prior-year funds, \$544.4M production funding is required to cover FY 71 production requirements.

The C-5A Program is managed by the Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio. Colonel Kenneth Beckman is the C-5A Program Director.

AIRBORNE WARNING AND CONTROL SYSTEM (AWACS)

The Airborne Warning and Control System (AWACS) will provide an airborne air surveillance system and the associated command, control and communications functions with the capability of automatically detecting and tracking aircraft targets operating at all altitudes over land and water. AWACS will provide the U.S. Air Force a needed capability in low altitude aircraft detection.

The AWACS system, which will operate in a modified McDonnell Douglas DC-8 or a Boeing 707 airframe, will include sensor equipment which will detect, track and identify airborne targets.

As currently being developed AWACS will be capable of operating in either an

air defense or tactical role.

Our present Air Defense structure is postured around the use of fixed ground based radars and control centers (SAGE/BUIC and distant early warning line radars) and a limited force of EC-121 radar picket aircraft. This entire system has a limited capability against low altitude attack and little survivability against a nuclear attack.

against a nuclear attack.

Employment of AWACS with its high chance of survivability, both high-low detection/tracking capability, along with its command and control ability will

increase the effectiveness of the Air Defense of the CONUS.

The need for a tactical AWACS is best illustrated by our experience in Southeast Asia. The airborne tactical air control system includes the use of a number of different type aircraft which inherently induces problems of control of our airborne forces. This entire mix of aircraft and systems can be replaced with tactically configured AWACS aircraft.

The AWACS program has undergone extensive study since inception and the

program under development today has evolved to meet our current needs.

An Overland Radar Technology (ORT) program, completed in 1967, confirmed the feasibility of an overland radar in that two radar techniques demonstrated sufficient ability to reject clutter for overland operation. These tests and contractor concept formulation studies enabled the Air Force to prepare a Concept Formulation Package in November 1967, proposing the AWACS program.

Further evaluation of both technological data and Air Force requirements led to the consideration of alternative surveillance and interceptor programs for the Continental United States defense in the 1975–1985 era. In late 1967, a Secretary of Defense decision approved an AWACS force as a replacement for the existing costly ground radar Semi-Automatic Ground Environment (SAGE) control structure.

In November 1968, the Secretary of Defense authorized Contract Definition for AWACS. This definition was to include a full scale radar demonstration effort and development of certain added sub-systems for a tactical configuration of AWACS.

After contract definition results were in, we reassessed Air Force needs. A revised program was identified calling for a "Core" configuration. This "Core" configuration contains only the absolute minimum equipment to perform the surveillance and control function with provisions for growth and added capabilities as future operational needs arise. This configuration is constructed to avoid development of new hardware, such as computers, to provide a unique capability when existing equipment will provide a minimally acceptable capability. Development and deployment of the "Core" configured aircraft will provide for the capability to perform both the air defense or tactical role. The estimated cost (in constant-value FY-69 dollars) of the "Core" configuration will be about \$2.1 billion.

Currently we are working to complete the Source Selection activity to select an airframe contractor. Source selection is expected in March 1970, with the contract to be awarded as soon thereafter as possible. Two radars (Hughes and Westinghouse) will be developed and flight tested. On the basis of test results we will select the most cost-effective radar. The contract will be negotiated for

all of the "Core" configuration.

Development and production of AWACS will occur essentially in four phases. First phase will be the brassboard radar demonstration; it is planned to have this demonstration completed in 28 months. At that time a decision for full Development, Test and Engineering (DT&E) is expected to be made. The second phase is system demonstration utilizing most of the equipment purchased in the brassboard effort with a single thread demonstration of the AWACS hardware. Success of the systems demonstration effort will trigger the decision for production release. Phase three is the production prototype Category I (Subsystems Tests) and Category II (System Tests) testing. Phase four is the production effort which leads to Initial Operational Capability (IOC) and Final Operational Capability (FOC).

Our current planning is to provide an operational capability during Calendar Year 1976.

For the fiscal year 1971 program we are asking for \$87 million. These funds will be committed to the brassboard/system demonstration radar effort and will be used to purchase two aircraft, two radars, and a minimum of instrumentation and displays, and start the development of long lead software items (computer programs).

In summary, the AWACS program is being managed to insure competition by industry and to assure that go-ahead decisions are keyed to the "fly-before-buy" principle. The schedule has been based on the philosophy of limiting cost commitments until flight test has provided sufficient information to allow a responsible decision for commitment to the next step in the program. Every effort has been made to structure the program so as to minimize the risk of retrofit in the production program. Availability of out-year dollars was a major factor considered in establishing decision milestones.

The AWACS program is managed by Electronic Systems Division, L. G. Hanscom Field, Mass. Colonel Kendall Russel is the System Program Director.

THE F-15 PROGRAM

Last month the Ad Hoc Committee on Tactical Air Power of the Senate Armed Services Committee was given a detailed briefing on the F-15 program. Therefore, in the time allotted for the F-15 today, I will briefly review the threat to our tactical air forces; describe the F-15 aircraft, and outline the F-15 program and its associated cost for fiscal year 1971.

You gentlemen are well aware that new Soviet-built aircraft will be the principal fighter threat to the United States tactical air power of the 1970s. Those new Soviet fighters possess capabilities which will include a high margin of superiority in terms of maneuverability over our best fighter of today—the F-4E. We view this soberly and to insure that our air superiority capability is maintained, we are developing the F-15.

We are aware also that the Soviets may not always be the adversary, but we can expect that a Soviet client nation will possess the FOXBAT or other lesser Soviet aircraft. The Soviets have shown over the years a propensity to export their high performance fighters in large numbers. Thus, the F-15 may be confronted with Soviet client nations' fighters in the struggle for air superiority. We must be prepared to fight any kind of war, at any place in the world, and to survive in that arena with a superior aircraft—the F-15.

It is the most wanted program in the Air Force today. The Systems Acquisition Contract, effective January 1, 1970, was awarded to McDonnell Douglas Corporation, St. Louis, Missouri.

The F-15 will be a single-place, fixed wing, twin engine jet fighter in the 40,000 pound weight class. It will have a sustained speed capability in excess of Mach 2, with maximum speed well over that. Its tactical missions are to be fighter sweep, escort, and combat air patrol; all of which require an ability to acquire, identify, engage, and destroy enemy aircraft in contested air space and in an enemy-controlled radar environment.

In addition to the extensive evaluation effort conducted in 1969, program management procedures were closely examined and major changes implemented. The changes affected both the Washington area and Wright-Patterson Air Force Base. Full responsibility for management of the F-15 program has been given the Program Director. The Program Director reports directly to me and from that point the channel is to the Air Force Chief of Staff, the Secretary of the Air Force, and, if necessary, to the Assistant Secretary of Defense. This arrangement greatly reduces the time required for obtaining program decisions at the proper level.

In order to properly manage any program, the Program Director must have visibility of the progress and associated cost. The F-15 management information system includes the requirement for the contractor to maintain a detailed accounting of progress and expenditures in accordance with an approved work breakdown structure. Special emphasis is being placed on weight control and configuration management to assure that we do produce an aircraft with superior performance. In depth consideration of operation and maintenance is achieved by utilizing the integrated logistics systems management approach, as well as comprehensive reliability and maintainability programs. Highly qualified and experienced people have been selected to manage this program and action has been taken to insure that key people are retained for continuity.

Taking advantage of the experience gained from recent major weapon systems acquisition, the Air Force has structured the F-15 procurement approach to more equitably match the program risks with the contract type. This has resulted in the employment of a combined Cost Plus Incentive Fee (CPIF) and Fixed Price Incentive Successive Targets (FPIS) type of arrangement. The F-15 contract is a single document containing three distinct items of work.

Item 1, the Cost Plus Incentive Fee portion of the contract, covers the design of the aircraft, aerospace ground equipment and tooling. In addition, it covers Category I flight testing, contractor support for Category II flight testing plus the structural, fatigue and other pertinent testing. Miscellaneous non-deliverable hardware also come under this item.

Item 2 is the first segment of the contract involving a Fixed Price Incentive with Successive Targets. This item includes the Category I and II test aircraft

plus spares and ground equipment to support the test program.

Item 3 is the second Fixed Price Incentive Successive Targets segment of the contract for the first wing of operational aircraft (107 planes). Initial spares and aerospace ground equipment to support the first wing will be provisioned.

In addition, the contract contains several special provisions including a demonstration milestone concept, total system performance responsibility, limitations of government funding obligations, and also not-to-exceed ceiling options for an additional two wings of aircraft.

The demonstration milestone provision implements the latest Department of Defense concept for confirming system design feasibility by means of technical

demonstrations prior to committing large sums of production funds.

Under this clause, specific significant technical milestones are identified and their planned dates for accomplishment are included in the contract. The government will unilaterally determine whether the milestone has been satisfactorily completed. Failure to meet a milestone may result in a delay in funding of a production increment, or a partial allotment to sustain minimum production at the government's option. If there is a delay, schedules will be adjusted accordingly at no change in initial targets or ceilings. Each item of the contract has an incentive provision on cost; we feel that this milestone concept appropriately motivates the contractor in regard to performance and schedule.

On the matter of F-15 funding, we are asking for a total of \$370 million for FY-1971. This money will be used to accomplish: one, the major portion of F-15 engineering development; two, detailed design for the airframe and avionics; three, fabrication of components and subassemblies for the first Category I aircraft; and four, component static and fatigue tests. As you can see during the first year, we are buying a great deal of effort and very little hardware which

is characteristic of a new program.

To summarize the overall F-15 program status, the Systems Acquisition Contract with McDonnell Douglas was signed and released on December 31, 1969.

Design activities are fully underway.

A contract has been awarded with an effective date of 1 March 1970, for continuation of the development of the engine for both the F-15 and the F-14B. The cost of this contract is shared with the Navy, and excellent progress is being made.

The Air Force is initiating the system definition phase for the AIM-82—a highly maneuverable dogfight missile. We have coordinated our requirements

with those of the Navy which will provide the option for joint use.

The RFP for this missile was released to industry on February 9, 1970 and proposals were received from six companies on March 9, 1970. In April 1970, at least two contractors will be selected for a 90 days competitive design period. Subsequently, two contractors will be selected for the competitive development phase.

Both contractors of the F-15 attack radar are flying engineering models at present. The final flyoff competition will be held in July and August at St. Louis,

Missouri, with McDonnell Douglas selecting the winning design.

The proven 20mm Gatling gun is programmed for installation in the F-15, however, it lacks the desired kill capability for air-to-air maneuvering combat. To provide the F-15 with a superior gun, the Air Force has, under Advanced Development, a 25mm gun using caseless ammunition.

Two competing contractors have built and are firing multiple bursts with their guns. While these are not flight-weight systems, we have proven that caseless ammunition is feasible.

The F-15 System Program Director is Brigadier General Benjamin N. Bellis.

A-7D PROGRAM

History

The A-7 program was initiated by the Navy in 1963 following completion of a comprehensive study to define the requirements for an improved follow-on light attack aircraft to replace the A-4 light attack aircraft. The study concluded

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that the requirement could best be met at reasonable cost by development of a modified version of one of several fighter or attack aircraft already in the operational inventory. A design competition was held in which four competing proposals were submitted. A design based on a major modification of the F-8 fighter aircraft, proposed by Ling-Temco-Vought was selected as the winner, and a development contract, with fixed price production options was awarded in March 1964. The first version of this new attack aircraft was designated A-7A and was developed on a relatively short schedule involving only about 43 months from development contract award to first combat deployment. The development was very successful, and the two versions which have been utilized to date in combat, the Navy A-7A and A-7B, have established creditable records.

Air Force Requirement and Possible Solutions

The requirement for the Air Force A-7D aircraft essentially stems from the roles and mission decision that the Air Force would provide close air support to the Army field units. It was felt by many that this commitment could be best achieved by optimizing an existing aircraft for that role instead of undertaking a completely new development. In the early stages of arriving at a hardware decision, several aircraft were considered including the A-1, F-100, F-105, and F-4 together with the A-7A/B. In various cost effectiveness studies, the A7A/B optimized for the specific Air Force needs appeared to be the appropriate choice. This was partly based on the A-1s inability to fulfill all of the mission requirements, and in the case of the F-100 and F-105 (both being out of production), they each would have required prohibitive start-up costs. Also, there was a replacement need for the F-100 fighter-bomber, which will be phased out of the first-line force in the early seventies. Compared to the F-100, the A-7D has more than twice the maximum ordnance load, two to four times the combat radius and/or loiter capability, and two to three times better weapon delivery accuracy.

Risks and Program Evolution

The A-7D was considered to be well within the state-of-the-art in that it was a modified version of an existing aircraft, and consequently, the Secretary of Defense directed the procurement of the A-7 by the Air Force for the close air support mission. Subsequent to that decision, the TF-41 engine was approved to enhance the A-7's performance. This engine is a derivative of the Rolls-Royce Spey and is being produced by Allison, a division of General Motors. Additionally, other aircraft configuration changes such as survivability, in-flight refueling. larger tires, anti-skid brakes, M-61 gun, the use of Air Force ordnance, life support and communications equipment, etc., were also approved to further optimize the aircraft for land based operation and/or make it compatible with the TAC force. Studies of aircraft vulnerability showed that survivability improvement were necessary to reduce combat losses. The most significant change to the A-7A/B, however, was approval of the Navigation Weapon Delivery System (NWDS), that brought the delivery capabilities within the desired accuracy. Studies concluded that a system consisting of a central digital computer, inertial measurement set, heads-up display, doppler radar, and forward looking radar, would provide a major improvement in combat effectiveness through improvements in weapon delivery accuracy and navigation accuracy. Based on contractor, Navy, and Air Force studies, combat effectiveness of the A-7D was judged to be from 2.2 to 2.5 times better than that of the A-7A. Although the A-7D acquisition cost is higher, its attrition in anticipated combat situations is significantly lower, so that the net cost effectiveness is better than that of the A-7A.

Description of System/Mission

The A-7D aircraft is designed to provide a high degree of utility and flexibility for its basic missions, with capability to carry various combinations of essentially all types of air-to-ground tactical ordnance in the inventory and sufficient payload-range capability to perform most missions without dependence on external fuel or inflight refueling.

The principal role for the Air Force A-7D is close air support of Army ground forces. The secondary role is interdiction of targets utilizing conventional air-to-ground ordnance, and various standoff air-to-ground tactical missiles.

Contracts, Management Approach and Cost Growth

The A-7D is being procured under a fixed price incentive (successive target) contract with LTV Aerospace Corporation, definitized in February 1969. The initial trade studies and long lead items for A-7D test aircraft were procured under letter contract in October 1966. Engines (TF-41) for all A-7D aircraft and for the Navy A-7E aircraft (after the first 67, which are equipped TF-30 P8 engines) are being developed and produced under a fixed-price incentive contract with Allison Division, General Motors Corporation, definitized in December 1966. The TF-41 is a development of the Rolls Royce Spey turbofan engine, built by Allison under a Rolls Royce license agreement. The contract is for five test engines and 500 production engines with options for 1500 additional engines. In May 1969, option for 240 engines (in addition to the original order for 500) was exercised.

The management approach in the A-7 program has been a joint service effort with the Navy and has worked exceedingly well in that many areas of duplication concerning development and flight testing were either eliminated or shared on a cost basis. While there has been a substantial cost growth on this program from the original A-7A projections, this growth is related primarily to the aforemention configuration changes, program stretch-outs due to budgetary constraints and the effect of the economic escalation in material and wages experienced throughout the industry. Some increases attributed to program stretchouts have been encountered.

Schedule and Current Program Status

The original schedule for the A-7D, based on Secretary of Defense program approval of August 1966, called for initial operational capability in March 1970. However, trade studies, configuration determination studies, together with numerous changes in force level and production quantity planning in succeeding years, led to the current plan which can be easily met with low risk.

To date, all flight testing indicates that the A-7D contractor will meet or exceed all of the performance guarantees. This is particularly encouraging in the Navigation Weapon Delivery accuracy which is a substantial improvement over current systems in the TAC inventory. Category I testing conducted by the prime contractor, LTV, is approximately 95% complete. Category II testing conducted by the Government at Edwards Air Force Base, California, is well underway and Category III testing conducted by TAC has begun. Additionally, climatic testing conducted by the Aeronautical Systems Division has thus far successfully completed climatic hangar testing at Eglin Air Force Base, Florida, tropic testing in the Canal Zone and arctic testing in Alaska. Desert testing will be conducted this summer. Thus far there have been no major problems encountered and the Government's testing is indeed verifying the performance conclusions as seen in Category I. The contractor is on schedule with his production deliveries. We are now delivering A-7D aircraft to the Tactical Air Command.

Significant Items in Fiscal Year 1971 Budget

The number of aircraft requested in the FY 1971 President's budget will enable us to meet the currently planned FY 1971 procurement level. A subsequent buy in FY 1972 is planned in such a manner as to protect reorder lead time in FY 1973 should the ultimate force decision be for more than the three wings now planned. Of particular note is the fact that all of the research and development and nonrecurring costs have essentially been expended and subsequent procurement need only address the flyaway and support costs of the aircraft itself. It is anticipated that the ultimate force decision will be made prior to the expiration of reorder lead time. As previously stated, the A-7D is meeting all of its performance goals and proceeding on schedule. We are now placing our primary management emphasis on maintainability and reliability. Our goal is 17 to 20 manhours per flying hour which would indeed be a significant achievement for a weapon system of this complexity. It is still too early in the program to make this assessment, but our preliminary data looks quite favorable.

The A-7D is assigned to Aeronautical Systems Division. ASD has a joint program office with the Navy here in Washington. Colonel Stoneberger is the Program Director for A-7D.

AGM-65 (MAVERICK) MISSILE PROGRAM

The AGM-65A MAVERICK missile is a relatively small, highly accurate electro-optical terminal homing air-to-ground missile that will significantly improve the strike capability of our tactical air forces. Its mission is the destruction of a wide range of close-support, interdiction, and counter-air targets-the small targets of the battlefield such as armored vehicles, concrete field fortifications. revetments, gun positions, parked aircraft and communication vans which require a very accurate attack capability. The F-4D/E and the A-7D aircraft, when equipped with MAVERICK missiles, will provide a high kill capability against these tactical surface targets. The missile is capable of automatically homing on almost any target that the pilot can see and is guided to the center of the target by its television camera tracker. The warhead is a high-explosive shaped charge.

Our cost-effectiveness studies have shown that aircraft attrition is the dominating mission-cost factor in a high threat environment. The size of the required tactical force is highly dependent on the single-pass kill probabilities of our weapons and the degree of the launch aircraft's vulnerability to defenses during delivery of tactical weapons. MAVERICK has been designed to equip tactical air with a very accurate standoff missile, capable of a high probability of kill against the large spectrum of small, hard or protected targets which make up today's battlefield. MAVERICK's accuracy and lethality will provide a capability to kill small, hard targets. The MAVERICK launch and carriage envelope will provide additional advantages for tactical flexibility of employment.

The missile development program has incorporated minimum technical risk, utilizing proven techniques in all of the weapon subsystems. The missile's present configuration is approximately eight feet long, twelve inches in diameter, and weighs 475 pounds. Propulsion is provided by a solid propellant boost sustain motor. The warhead is a 130 pound, high explosive, penetration charge. The pilot is provided with a capability to locate visually acquired ground targets on a video cockpit television screen. He orients and locks the missile's electro-optical tracker on the selected target and initiates launch. The missile is automatically guided to the target by the TV centroid tracker and the launch aircraft is free to conduct whatever evasive and escape maneuvers are required after launch.

A fixed price incentive contract was awarded to Hughes Aircraft Company in July 1968 for development of the MAVERICK missile system. The contract includes a Research, Development, Test and Engineering target price of \$95 million. with priced production options for missile procurement, supporting ground and training equipment, launchers, and required data. The contract requires that the weapon system be successfully demonstrated during the Category II flight test. These tests will be conducted by the Air Force prior to Air Force acceptance of the production configuration. Any hardware or data produced, including spares, prior to Air Force acceptance, must be updated by the contractor to the approved configuration at no change in target price.

The first production option is contractually specified as June 1970 with provisions for the delay of this option, without change in target price, until the contractor's Category I flight test program has accomplished three successful guided missile flights. Additionally, a unilateral delay clause permits the Air Force to delay the exercise of the first production option on a monthly basis for a period of up to 14 months at a stipulated schedule of price increases for

each month delayed.

With the exception of several weeks delay incurred at the start of the development program, primarily due to non-availability of government wind tunnel facilities, the MAVERICK development program proceeded on schedule. Although the flight test program is in its initial stages, results attained thus far have been very encouraging. All objectives of the flight test program to establish compatibility of the missile with the F-4 aircraft were completed ahead of schedule in early November 1969. Fifty-one successful carriage, jettison and powered separation tests were completed. The first Category I launch of a guided MAVERICK missile was accomplished on 18 December 1969. The test was completed successful. The missile was launched at a stationary M-41 tank. The tank was destroyed even though a warhead was not used. The second launch of a guided weapon was accomplished on 25 February 1970. The missile was launched from an F-4D against a forty foot square simulated building. Significant data was obtained and post-flight analysis of the test data verified that the seeker tracking logic performed properly with no subsystem malfunction. The contractor's Category I flight test program will continue throughout this year.

The significant events currently scheduled for fiscal year 1971 include completion of the Category I flight test program, completion of approximately one-half of the Category II flight test program, and initiation of initial production procurement contingent upon continuing success of the development program.

With the exception of the costs incurred by several weeks delay at the start of the development program, primarily due to non-availability of wind tunnels, the MAVERICK development contract with Hughes has remained within the

contractor's budget, on target price, since contract award in July 1968.

The current RDT&E budget estimate of \$128.8 million is \$5.7 million higher than the one submitted immediately after the July 1968 contract award which totaled \$123.1 million. This current requirement includes \$12.8 million for contract definition and \$116.0 million for effort after award of the acquisition contract. The \$116.0 million includes \$95 million for the Hughes contract and R&D support contracts with McDonnell Douglas for the F-4 aircraft and LTV for the A-7 aircraft. The principal factors accounting for the increase of \$5.7 million are our estimates for abnormal economic escalation, payment of contractual performance incentives, an increase in requirements for test center support, and the authorized or forecasted changes to the Hughes contract.

The July 1968 budget estimate for production, including an AFLC initial spares estimate, compared to our present contract program estimate, including the same initial spares estimate, has increased approximately 1.8%. This total assumes exercise of the first production option for missiles in July 1970. The principal factors accounting for the increase are our estimates for abnormal economic escalation and payment of contractual performance incentives, the authorized and forecasted changes to the Hughes contract, and a shift in part of the depot

AGE estimate from the RDT&E to the production appropriation.

The fiscal year 1971 Budget Estimate relates to a new total production quantity which can essentially be accommodated within the production options available in the contract. Because of fiscal year 1971 funding constraints, the Air Force currently plans to delay full exercise of the initial production option. Since this delay would similarly delay the initial operational date, the Air Force is requesting money in fiscal year 1971 so that the procurement of tooling and long lead time items in support of initial production can be supported, should the progress of test program so warrant. This will require a contract renegotiation but the technical, warranty, and price advantages of the existing contract will be essentially maintained. Assuming that the revised production funding requirements for fiscal year 1972 and fiscal year 1973 would be fully supported, we estimate that this program will increase unit production cost. Any further stretch-out of the production program will require a renegotiated contract with Hughes. We anticipate such a renegotiation would result in significant additional increases in production unit cost.

The MAVERICK Program is managed by our Aeronautical Systems Division at Wright-Patterson Air Force Base, Ohio, and Colonel Robert A. Rushworth

is the MAVERICK Program Director.

PRIMARY RESPONSIBILITY

General Ferguson. Now, Mr. Chairman, that completes my statement that I would like to put before the committee this morning. I invite you to put questions to us.

Chairman STENNIS. You mean with reference to the different weap-

ons and various programs?

General Ferguson. Yes, sir. As you have already pointed out on the record, I have eight program directors here who are in charge of the eight most important programs in the Air Force today.

Chairman STENNIS. Really though, you are in charge of all of these,

are you not?

General Ferguson. I am, sir; yes, sir.

Chairman STENNIS. We are going to question some of the program directors no doubt, but frankly we have to have someone that we can look to primarily.

General Ferguson. Yes, sir.



Chairman Stennis. This reads mighty good to me, General. Gentlemen, we are reading from section D in the book, describing the new system of responsibility and decentralization of control, pages 4 to 8.

You as the General in charge of systems command have just said that you are the one responsible for these different programs. Does that mean that you selected these gentlemen who are in charge of the program?

General Ferguson. I did indeed, sir.

Chairman STENNIS. All right. I asked that question because that is the test of whether you are really in charge or not, I think, and, therefore, we have more reason to look to you.

PRESENT SYSTEM VERSUS PAST PROCEDURE

Your description here of how you plan to operate this matter, is to decentralize the control and put it more or less out of the Pentagon into your hands, and you in turn then have these different programs in charge of these gentlemen that I named.

Not being critical or involving you in anything but the previous administration, but contrast that system you have just described with

the way it has been done heretofore.

General Ferguson. In the case of the several programs currently active, the concern expressed at top levels of Government, particularly in the Defense Department, resulted in detailed management being exercised at the top levels of the Defense Department, very often dealing directly with the program director and/or the contractor. This left the management structure of the Air Force, which involves and includes my headquarters, pretty well out of the stream of activities.

This, of course, created a number of problems for us, because once a decision was taken, if you were not part of the decision, it is difficult

to implement, no matter how hard you try to do so.

The actions that have taken place in the last year reversed this trend, as I have said in my statement earlier. Once a program is approved within the Air Force and the Department of Defense, the directive to include the schedule and the objectives and the funds to be made available to pursue this program are directed to me, and I in turn select and direct an individual whom I hold responsible for the implementation of that program.

Under these circumstances it is clear who is responsible. It is clear who is leading the team. It is clear who is the point of contact with the

contractor.

To add to that, we have instituted a reporting schedule. At my headquarters every Monday morning my entire staff reviews one or more programs in detail. I listen to the program director, and he describes for me the progress that he is making against the plan, and the difficulties he foresees or that he has, and that afternoon we go to the Pentagon and discuss these matters with the air staff, and the following morning with the Chief and the Secretary of the Air Force.

This is done on a weekly basis, so that there is much more careful examination of progress of these programs against plan than I have ever seen before in my experience in Washington. While it is a little

early, I can see beneficial results already by this process.

Chairman Stennis. Pardon me, let me interrupt right there. You say it is more than you have seen at the Pentagon. It is more than we too have seen at this stage, but is it a better system in your opinion?

General Ferguson. In my opinion it is much better.

Chairman STENNIS. You are entitled to an opinion, and we are entitled to get it just in the raw. Your opinion is that it is much better?

General Ferguson. It embraces the sound and proven principles of management, that once a decision is taken, and the authority has been granted to a subordinate element to perform, then that level should be permitted to perform and to report its progress.

Now if top management is not pleased with the progress that is being made, they know precisely where to make changes. I fully support the

direction in which we are now moving.

REPORTING PRACTICES

Chairman Stennis. Are you in sympathy with all this reporting that the Pentagon is requiring you to make? Do you think this periodic

reporting is a good idea?

General Ferguson. I think that what happens typically is that the idea is fundamentally sound and good to start with. As it is developed it gets too voluminous, so periodically we have to go back and ask ourselves whether or not all this information is necessary. In my opinion we are at this stage now.

Chairman STENNIS. I know that last year that we would call on you for certain reports periodically on major contracts, so that shows that we are thinking in the same direction. I think we are benefiting by it.

I said last year that the man in the military carries a lot of responsibility in connection with these contracts. Whether he has the authority or not, he is blamed, just as the Air Force is now blamed on some contracts, notably the C-5A. The public has forgotten who was

the Secretary of Defense when that contract was made.

I learned that the military needed more talent in the field of management. I said well, the services have this responsibility to the committee and to the public, they will have to put more talent in that field. Then I was told it is not an attractive field for a young officer in the military. Promotions come faster somewhere else. This field has not been underscored and given its proper place in the sun.

I think you have got to assign some of your best talent to this field and you have got to train them early. It is going to take more and

more money to have these frontline weapons.

I favor having the best, but as we all know, it is already harder for you to get the military money than it was a few years ago. When the shooting stops in Vietnam, it will be harder still. I hope you put more and more talent in this field, and you will have a better chance then, General.

General Ferguson. May I respond to those comments, Mr. Chairman?

Chairman STENNIS. Yes; I will be glad for you to respond.

General Ferguson. In the last year I have held two meetings and I have a third one scheduled for next week with all my major program directors to do precisely what you are now discussing.

First of all, the selection of the man with the appropriate background to manage these large programs, the training of young men who can move up to the management of these programs, the tenure. We are attempting to stabilize as best we can the assignments to one of these programs so that an officer is there long enough so that both he and I can look back over our shoulders and see what he has really accomplished, what he has done. I want to make the position of the program director one that carries with it the responsibility and recognition that will result in at least an equal opportunity for promotion, and that has already shown up in last year's list, for example.

My objective, is to elevate the image of a program director to one that is a position of major responsibility in terms of management, major responsibility in the Air Force that will lead to advancement in rank; wherever we can accomplish this, and as I say, we have done

very well in this last year following this policy.

We have officers who are responsible for the direction of programs that are budgeted for up to \$1 billion a year. When one considers that kind of responsibility and what kind of a man you have to have to do that, it becomes clear we must be very selective.

We have one present here this morning that can describe to you his program of that magnitude, and I am fully confident that he is

completely on top of it to your satisfaction as well as mine.

Chairman Stennis. What you have to say is very encouraging, and I am glad to see you in the position you are now in.

PROGRESS ON C-5A CONTRACT

One word here, and my time will be up. We have this C-5A matter, and I am thinking of it as a problem that goes through the whole military program this year. Briefly, what has happened in this C-5A con-

tract since a year ago?

There is no testimony that we had about this calamitous situation about the finances of the company. What has happened so far as you know that is different from a year ago? In other words, why weren't we told about these things last year? Can you shed any light on that?

General Ferguson. Let me try, Mr. Chairman.

Chairman Stennis. Yes.

General Ferguson. First of all I think it was the 19th of January last year on which the Defense Department made a commitment on a portion of run B, the second half of the procurement.

Chairman Stennis. That is right.

General Ferguson. As I understand it, the Defense Department had one interpretation of its commitment which was just to a portion of run B, and the contractor, on the other hand, has the impression that the Defense Department had committed itself to the total run.

Chairman Stennis. To 115.

General Ferguson. Yes; 115 instead of 81 at that point in time. This has created a disagreement between the Defense Department and

the contractor that has not yet been resolved.

About a year ago Secretary Seamans appointed his Assistant, Secretary Whittaker, to focus his attention on the C-5 contractural question, with a view to bringing it to some sort of satisfactory conclusion as quickly as possible. He has worked long and hard with all the help from our program office to try to come to some accommodation and some agreement with the contractor, up to this point we have not been successful.

As you know from testimony by other Defense witnesses earlier, this is a matter that transcends Air Force interest. There are a number of defense contracts with Lockheed, and at the moment it is Secretary Packard who is the man carrying the full responsibility in terms of attempting to find some satisfactory negotiating position with the contractor.

We are, however, moving ahead within the presently approved program and with those funds that are presently authorized by Congress. That is about all I can say on the contractural aspect, Mr. Chairman.

CENTRALIZATION OF CONTROL

Chairman STENNIS. We will have a round of questions now. These statements have been put in the record and the high points have been covered. This is the procurement now that is before us for the Air Force, and tomorrow we will take up research and development for the Air Force.

As you know, General Ferguson has been testifying and General Glasser is with him. General Glasser is Deputy Chief of Staff for Research and Development, but he will testify today on the procurement portion of the bill. Senator Murphy, may I call on you now, sir?

Senator MURPHY. General, I am sorry I was not here for your entire testimony. Who brought about this so-called centralization of the control? Was that choice by the Air Force or was that done by the

civilians in the Pentagon?

General Ferguson. This was in the early sixties when the new administration at that time came in and took a look at the overall situation in the Defense Department. I think perhaps the great interest that was aroused at the time in connection with the award of the F-111 started the practice of detailed direction at that level.

The air staff of the Air Force itself had nothing to do with that

decision. All we could do was respond to it.

Senator MURPHY. Was it your feeling at the time that that would work or was it your guess that maybe that would create the problems

that we are facing today?

General Ferguson. Senator Murphy, we are in a position of having to try to make any kind of direction work, and we tried hard, and it resulted in the air staff becoming more involved in program management, simply to be in a position to respond to the Defense Department.

Senator MURPHY. Under the new administration, you are being given the opportunity to put your experience and your inclinations in these fields to work, is that a fair statement?

General Ferguson. That is correct, yes.

INTERSERVICE COMPETITION

Senator MURPHY. Obviously the change was brought about and probably speeded up by the bad publicity that has ensued from a lot of these. You have an officer that goes on the job and is responsible as the project officer.

Now in industry, if a fellow takes on the job as the head of a department or a branch of a corporation, and he does badly, he is removed, and he is out of work. What can you do in the military comparable to that?

General Ferguson. The same thing, sir.

Senator Murphy. I know that people don't change just because they put on a uniform.

General Ferguson. The same thing. If he doesn't perform, he is

moved and very often he gets the message and he moves out.

Senator MURPHY. The military has been accused over the years of being like the Senate, in that it is a club and everybody protects everybody else in the club and nobody lets the outside know what is going on. I do not believe that is any more true of the military than it is of the Senate.

General Ferguson. It is not true, sir.

Senator MURPHY. The competition then is just as active in the military, possibly more active would you say than on the outside?

General Ferguson. I would say that it is more active. I think everyone or almost everyone I have been associated with in the service is

interested in moving ahead.

There are opportunities for moving ahead if a man shows his mettle. In this business we are in it is highly competitive with more than 6,000 colonels in the Air Force, most of whom are reviewed for opportunities for advancement. Maybe only 50 of them are picked each year, and so you can see there is keen competition, but there is opportunity for advancement.

C-5A DISAGREEMENT

Senator Murphy. In the C-5 contract, I would like to have you discuss the reason for the disagreement in that contract. Here is a tremendous amount of money involved, and I am sure numerous banks of lawyers and experts sat on these contracts, and suddenly we find complete disagreement as to what the contract means between the Department of Defense and the Air Force on one side, and the manufacturer on the other. Why would you suspect that that disagreement would be possible?

General Ferguson. Senator Murphy, if I can make a general comment and then ask my program director to expand further in response

to your question, I would say this.

It is an unusual contract. In hindsight, as we look at it, there are opportunities for misinterpretation of the provisions of that contract. It is an extremely complex one that involved an initial run of aircraft and then an examination of their performance, inflationary trends and things of this sort, and a formula that was to take experience into account in connection with the follow-on buy of airplanes.

Now the Defense Department did not, so far as I understand it, intend to commit itself to the total second run of airplanes, but only to a portion of it. The contractor, on the other hand, reads the same words and interprets the results, and the actions on the part of the

Defense Department, quite differently.

Senator Murphy. Is it really an interpretation or maybe an assumption on his part?

General Ferguson. It may be a portion of both, but Colonel Beckman, the program director, has been deeply involved in this, and if I

may I would like to ask him to respond further.

Colonel Beckman. I can't think of much to add. Generally it is a question of interpretation, sir. The contract as originally written perhaps was not wargamed, if you will, well enough before it was awarded to anticipate some of the unusual conditions that we have gotten into. Certainly when the contract was let we did not expect to see the cost of performing the contract increase so rapidly.

Senator MURPHY. If I may interrupt though—you fellows, you know, have been at this some time now, and since I have been here I find that in the great percentage of cases the contracts are drawn in such a way or not drawn in such a way that there are always overruns.

It always costs more than you think it is going to cost.

I am not new to that. I used to be in the picture businss, and we used to have schedules for the shooting of a motion picture, and I said to my boss "How many pictures come in on schedule or under schedule?"

"None of them."

They all ran 20 or 25 percent over. Then I said "Why don't you make the schedule right and stop kidding ourselves?"

Now has that been on old habit that we ought to break ourselves of,

do you think? Have we been inclined to kid ourselves?

Colonel Beckman. Yes, sir, and I think General Ferguson answered that in his introductory remarks that we are giving more thought and time to establishing the initial schedules during the contract definition phase, if you will.

We did have kind of a legislated schedule in the C-5. We were striving to arrive at initial operating capability date of December 1969. Therefore we had to work back from that date, and we had to

squeeze the program considerably.

The program was originally recommended to extend really until about September of 1971 before the initial operating capability date would occur. We cut about 22 months out of that back to December of 1969.

Senator MURPHY. This is extremely important in my case, because a lot of it happens in my State. Beyond the end result of the aircraft, and the newspaper stories about the overruns, there are a lot of tax-payers in my State who are worried about their jobs, and whether that corporation—either through their fault or this misunderstanding—can continue. That it is a very sensitive thing.

TENURE CONTROL

General Ferguson, you said that you were going to control tenure

as best you can. What did you mean by that?

General Ferguson. Having assigned an officer to a position, so long as he is performing satisfactorily I would hold him there 3, 4 or 5

years, a minimum of 3 years.

Now then, if he is not performing satisfactorily obviously I would move him out. The only other reason for moving him would be if he were assigned beyond my control to a position of greater responsibility, or if he were promoted to a rank that was not commensurate with what was authorized.

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Senator Murphy. I know one fellow in the military, for instance, a close friend of mine, who had an extraordinary capability in one area, and he became almost legendary in SAC, because he had been on that job much longer than anybody else. In other words, I have the feeling that you stay on the job 2, 3 or 4 years and then you move

on and somebody else takes it.

To achieve what we are hoping to see, I would think that the formula would have to be that if a fellow turns out to be the best officer for a particular job, there should be no limit to his tenure, and that that should be his job. As you say, you are trying to set up a system comparable to what has to operate in private industry, because if private industry doesn't do it right, they are out of business.

General Ferguson. That is right.

Senator MURPHY. If you fellows don't do it right you can come back up here and if you get some sympathetic ears, you might get a new source of money to try it again next year. But now we have gotten to the place where the heat is on us, and we can't be that charitable. We are going to be held responsible and properly so, in the public press and with the constituency, and we are going to have to hold you fellows responsible so that we don't suddenly have to say, we are not just a couple of million dollars out in overruns, but we are \$2 billion out of line.

Some of these figures here are just unbelievable, not only in this

instance, but some of the other military branches as well.

You are, however, satisfied now that under the new management concept, you are going to have a capability that will give us greater assurance that we won't have these unfortunate surprises?

General Ferguson. I am satisfied that we are headed in that way, Senator Murphy. Let me say just one more word about the tenure of

program directors, because you referred to that earlier.

I think you will agree with me that 12 or 14 years in one program is perhaps too long, and we have instances in which programs have been running that long. I am looking for a time span in which both I and the program director can look back and see his accomplishments. I would look for a reasonable milestone where we change the model, where we have accomplished some significant piece of the total, and that would be 3 to 5, perhaps 6 years. These are only guidelines.

Senator MURPHY. My point is this—

General Ferguson. They are not inflexible.

Senator Murphy. A man can have a particular capability—he may be a lousy pilot, he may be a bad engineer, but he can very possibly be the best program director.

To give a rough example, in my experience a fellow who is good in mathematics is seldom good at languages. A fellow who is good at charity is not your good at history.

chemistry is not very good at history.

General Ferguson. Yes.

EXAMPLE OF PERSONNEL UTILIZATION

Senator MURPHY. My thought is this. Is there a possibility that when you get a fellow who has that unique capability of putting a team together, and making that it work, is there a possibility of keeping him in that particular job? If he is good enough to make one

model organizing a team, his technique would be just as capable with

another model.

General Ferguson. It is not only possible, we have an example right here today. General Bellis was in charge of the SR-71 program and did a very fine job there. He has been given the F-15 program. It is an elevation in responsibility and rank at the same time, so we are not inflexible at all.

We have other instances in which we have specialists in a very narrow and important field, who have been and will continue to be in an

area for a number of years.

We are not forced or required by any rule to move the man. We take a look at his career progression, his contribution, and when we should give somebody else that kind of experience and exposure and move the incumbent up to a more responsible position.

Senator Murphy. Thank you very much, General.

Senator Symington. General Ferguson, it is good to see you.

General Ferguson. Thank you, Senator.

CONTRACT WORDING METHODS

Senator Murphy. May I ask one more question?

Senator Symington. Yes.

Senator MURPHY. Is there any new system that has been put in or is there a thought given to one so that we won't again arrive at a place where there will be a misunderstanding about the wording of the agreement—the semantics of a contract?

General Ferguson. I think that we have a model that we want to follow in the case of the F-15, in management and in terms of the

contract. The contract is tailored to suit the job to be done.

Senator Murphy. In the slight experience I have had with Government contracts, they always get so voluminous.

General Ferguson. Yes.
Senator Murphy. You can make them mean almost anything. I recall the finest lawyer in New York who wrote, wills, and he did most of the big estates. He wrote them on one sheet of paper, and you knew exactly what it meant. I am always accused of oversimplifying, but I think that that may be one of the keys to what we have to get back to, if we want to know what we are doing.

General Ferguson. I agree with your objective completely. I have issued such guidance to my staff. I want to know why we can't put correspondence on one page. Why does it have to go to two or more. Naturally a contract does have an inclination to get verbose, thus introducing opportunities for misinterpretation, but I must confess that

is not my field.

SATISFACTION WITH F-15 HANDLING

Senator Symington. General, as a member of Senator Cannon's Tactical Air Subcommittee, let me congratulate you all on the job done by General Bellis with respect to briefings on the F-15.

It was clear and concise. Now if we can go ahead with the plane as programed, and do not put a lot of scientific theoretical gadgets on it, conceived by theoretical scientists, maybe we can get an airplane which will fly as the pilots want, even though it does violate blueprints and a lot of expensive theory.

I hope you all stick to a clean air superiority fighter, which as I am sure you remember, I have been pleading for over 4 years and this for one simple reason. Our combat pilots who have been fighting and dying for us pleaded for it.

General Ferguson. Yes, sir.

Senator Symington. If there is any deviation in the current F-15 program, will you let this Committee know about it?

General Ferguson. May I comment on that, sir?

Senator Symington, Please.

General Ferguson. Before there is any deviation on the F-15, General Bellis comes to me and I go to General Ryan and collectively we determine whether or not this deviation ought to be approved. The going in position is "No." We have to have very strong argument before we make any changes whatsoever in that airplane.

PROCUREMENT PROGRAMS

Senator Symington. Let me compliment you on that. Between 1940 and 1945 I spent a large majority of my life cutting up airplanes to put more gadgets on them, sometimes desirable, and sometimes most undesirable.

On the C-5A, you started out to build 120, are now down to 81. Nobody supported Lockheed and the C-5A more, but I must say as of this morning it would appear the management has been poor; and I do not want to see the result of that fact dumped too hard on the Air Force.

There are other programs of that company also involved. The Cheyenne as example, and the more I look into it, the more of a

mystery that particular helicopter becomes to me.

On the F-111, I noticed in the statement you gave this morning you started out with 2,411 airplanes, are now down to 547. When one cuts an estimated production that much, anybody with any industrial experience knows it is bound to heavily increase costs, if for no other reason than the learning curves.

I understand the F-15 contract is different from these other contracts, different for example than the contract on the C-5A, correct?

General Ferguson. That is correct, sir.

Senator Symington. The contract on the C-5A was made in good

faith. If a mistake was made, I am sure it was sincerely.

If you are buying less airplanes than any year since 1935, which was when you were around the beginning of the B-17, naturally there are going to be some casualties.

As I remember, in radio in early 1929 there were some 57 companies: and by 1934 only seven of those 57 were left. To the best of my knowledge, although several merged, there is no manufacturing company that has left the industry.

Perhaps one left it voluntarily, but you now have this gigantic reduction in airframe work; actually for the Air Force you are buying less planes than you did in 1935. Is that a fair statement?

General Ferguson. Yes, sir, I believe it is.

Senator Symington. The A-X; did you cover that this morning? General Ferguson. That is not a program that is approved and directed on the Systems Command, so I can't speak to it directly, Mr. Chairman. Perhaps General Glasser would like to comment on it.

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General Glasser. Yes, sir; Mr. Chairman. The A-X is not in the procurement program for this year. That will be covered in the research and development portion. However, if you would like I can speak about the problem at this time.

A-7 PROGRAM COSTS

Senator Symington. What worries me, and I so presented yesterday to the Secretary and Chief of Staff, is the degree of money we are

putting in subsonic airplanes in this supersonic nuclear age.

That is not true of tactical air support, but I have watched the various efforts made to take the tactical air support mission away from the Air Force, where I think it should be, for many different reasons; but it seems if you are going to buy a heavy quantity of A-7s, at least to some extent they could fill the missions of the A-X's. General, what would be your comment on that?

General Ferguson. Are you addressing me, Senator Symington?

Senator Symington. Either one.

General Glasser. I spoke on the subject of the A-X to Senator Cannon's subcommittee and you were present at that time. We have looked at the A-7 as a close air support fighter, and it has shortcomings in that regard.

The A-X is a special purpose airplane which is designed for the very specific purpose of supporting engaged troops. It is a very mini-

mum cost airplane.

It is designed to have very high survivability; to operate close in in an unfriendly environment; and it is our conviction that despite some seeming unattractiveness, being a turboprop airplane, being a subsonic airplane, it is the best and most economical airplane for that purpose.

Senator Symington. It would be considerably less expensive than

the A-7; wouldn't it?

General Glasser. Yes, sir.

Senator Symington. How much less?

General Glasser. The unit program cost for the A-X is currently estimated at about 40 percent of that of the A-7.

Senator Symington. What is the present estimated cost, counting

cost growth, of the A-7?

General Glasser. We have the program director right here.

Senator Symington. What is the current estimated cost of the Λ -7, per unit, now?

General Glasser. On a unit program basis \$3.6 million, sir.

Senator Symington. So you are up over \$3.5 million apiece now for a subsonic airplane, and you can buy $2\frac{1}{2} \Lambda - X$'s then for one $\Lambda - 7$; correct?

General Glasser. Approximately so. We are estimating a unit program cost for the A-X of [deleted] million at this time, sir.

HARRIER SUPPORT MISSION

Senator Symington. Have you given serious consideration to the Harrier, which has the vertical advantage aspect of the helicopter? General Ryan said yesterday that was the advantage of the helicopter—and it also can move forward as a fixed-wing plane. It is being adopted by the Marines at the expense of R-4s, probably right from their standpoint.

Have you given consideration to the Harrier from the standpoint of Army support, when you consider what is going on in the development of helicopters as well as fixed-wing planes, both to support ground troops. The Marines also are ground troops and are positive about the above choice.

General Glasser. I might comment on the Harrier question, Senator Symington. The Air Force has had a long and active interest in the

Harrier program.

As I pointed out earlier to the subcommittee, the United States is a very major participant in the development of the Harrier aircraft

through the Mutual Weapons Development Program.

The Air Force has had and continues to have people actively participating in the program in England. We have had engineers, uniformed blue suit engineers working in the plant. As a matter of fact, the cockpit design is by an Air Force pilot.

We have two officers assigned to the initial squadrons of the RAF

Harrier program.

Senator Symington. I know that, General. I been briefed on it pretty thoroughly, and am asking have you given full consideration to it?

General Glasser. I was commenting on this to demonstrate the background of knowledge that we have of the airplane, and despite that it is our conviction that it is not the airplane for the close support of engaged troops.

There are many attractive features in a V/STOL airplane, and we

certainly want to press on with them.

Senator Symington. I left the Air Force 20 years ago next month. At that time my two primary interests from the standpoint of just commonsense were refueling and vertical takeoff. We now have pictures of two supersonic mach 2 plus Soviet STOL's, and one VTOL, the Soviets flying; pictures taken in the summer of 1967. We, the United States, have nothing; let me repeat, nothing in this field at all.

For the first time I know about, fall-out will come from commercial planes to the military instead of the other way around. For example, there is already a STOL strip at LaGuardia. But the determination of the Air Force in past years, long before your time or General Ferguson's, to ram their concept of air support down the Army's throat resulted in one of the support planes being designed by the Army, the C-123, and the other being bought from Canada, the Carribou. So I would hope, as we analyze this problem, we give some consideration to what the customer wants, instead of following people who arbitrarily want to decide what the customer should have. The best salesman, in my experience, is always the satisfied customer.

The Army is going to make a fight, everybody knows that, for the Cheyenne as against the A-X. I would hope the Air Force does not lose this mission. Air power is indivisible and the Air Force should

retain it.

PREPARED QUESTIONS FROM SENATOR SYMINGTON

I am over my time, and the distinguished Senator from Maine has come in: therefore I ask unanimous consent to file some questions for the record, General Ferguson, and please answer them for the record. General Ferguson. I will be pleased to respond, Mr. Chairman.

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(Questions submitted by Senator Symington. Answers supplied by the Department of the Air Force.)

Question. Wasn't the Air Force requirement that the F-111 be capable of going Mach 1.2 supersonic on-the-deck the greatest problem relative to the design and testing of the F-111?

Answer. The highest aerodynamic drag Q forces that the F-111 is subjected to in its entire flight envelope occur at low level, supersonic flight. The F-111 had to be designed with sufficient strength to endure these high Q loads. The requirement for sustained operation at 1.2 Mach at sea level led to the adoption of the variable sweep wing.

Question. Will the Air Force ever be able to achieve the objective in this area?

Answer. The F-111 has successively demonstrated the capability of 1.2 Mach sustained speed at sea level. However, the range capability at this speed is significantly less than originally estimated.

Question. What is the "life expectancy" of the F-111 wing boxes?

Answer. Fatigue testing has validated that the present wing box, with the modifications that are currently being installed throughout the fleet, will provide an unrestricted service life of 3,000 flight hours or about seven (7) years of life. We are hopeful that this test specimen will not fail until it has accumulated at least the number of load cycles necessary to validate a design service life of ten (10) years. In order to achieve this figure with a high statistical level of confidence, the test specimen is being subjected to the wear and tear equivalent to forty years—four (4) times the number of loadings we expect the actual aircraft to experience in its projected ten-year inventory life.

Question. When will they all have to be replaced and at what cost?

Answer. If the fatigue test specimen demonstrated a service life of ten (10) years, the first wing boxes would have to be replaced in 1978. The estimated cost of a replacement steel wing carry-through box, including labor, is \$123,000 per aircraft.

Question. What will be the estimated cost of pursuing the testing as a result of accident in December, 1969?

Answer. This cost is still being resolved as the exact nature of the solution is defined. However, our present estimate for proof testing and related inspections is \$31 million.

Question. Do you feel this course of action is absolutely essential?

inswer. The recovery program outlined is ultraconservative and is being pursued even though the probability of existence of another such flaw in an F-111 is extremely remote. However, the F-111 ad hoc committee of the Air Force Scientific Advisory Board has advised that accomplishment of this program is the only way we can positively assure that no flaws are present. As I previously stated, the Air Force regards the need for the F-111's unique long range all-weather interdiction capabilities to be a very pressing requirement. No other tactical aircraft is programmed for the inventory to meet these needs. We must take every precaution to insure that the F-111 obtains operational readiness.

Question. Would you have recommended this course of action if another type of aircraft was involved?

Answer. The recovery program is admittedly ultraconservative and is deliberately so as recommended by the F-111 ad hoc committee of the Air Force Scientific Advisory Board. Our intent is to positively insure that no other such rare metallurgical flaws exist in other F-111's. If the same kind of situation applied to another type of aircraft, we would probably recommend a similar course of action.

Question. What is the estimated number of aircraft that the Air Force will have to "give up" in order to pay for this additional testing?

Answer. Our current estimate is that the FY 1971 F-111F procurement will need to be reduced by four aircraft in order to finance proof testing and related inspections.

Question. General, at what maximum range can a pilot detect an enemy tank?

Answer. Numerous flight test efforts have been conducted for the purposes of determining actual detection, recognition and identification ranges for numerous

small targets under operational conditions. In these tests, tanks, or similar size targets, were detected at ranges up to 24,000 feet. The pilot's capability, however, varies considerably with experience, lighting conditions, visibility, target background, whether target is static or in motion, contrasts, etc.

Question. What are the problems, if any, with reference to his ability to detect and make a successful launch considering the time element involved when he is flying directly towards the tank. Would he not be almost directly upon the tank before launch could be made!

Answer. These tests and the captive flight tests conducted thus far with the Maverick system confirm that the required pilot activities to accomplish missile lock-on and launch can be performed within a realistic operational envelope. Weapon launch and aircraft escape can be accomplished at improved standoff ranges which will substantially increase the launch aircraft's probability of survival.

Question. What do you mean in your statement by the fact a "new electrooptical tracking logic in the TV guided system" is the primary area of risk?

Answer. The missile development program has utilized proven techniques in all of the weapon subsystems. Although the TV guidance system is similar to the systems we have used successfully on Walleye and the Mark 84 EO bomb, the Maverick centroid seeker employs a [deleted]. Although this guidance technique was demonstrated in a prototype system during the contract definition phase, we consider this the primary area of technical risk in the program.

Question. What was the Air Force's reasoning for reducing the total MAVE-RICK requirement from [deleted] to [deleted] missiles?

Answer. A recent re-calculation in January 1970 of the War Reserve Materiel requirements for MAVERICK missiles, based upon the elimination of the F-4C and F-111D as MAVERICK launch aircraft, reduced the total MAVERICK requirement from [deleted] to [deleted] missiles.

The F-4C aircraft are not equipped with the video displays required for a MAVERICK capability and it was considered uneconomical to retrofit these aircraft.

The F-111D has been identified primarily for the adverse weather, night attack role. The MAVERICK, which requires visual target acquisition, would have limited application in the F-111D role.

Question. Last year the Tactical Air Power Subcommittee was told that the Air Force was in great difficulty for lack of funds to exercise its option for the A-7 engine with the Allison Division of General Motors. Your statement indicates on page 66 that the option was exercised in May, 1969. Did you have a funding problem in this area or not?

Answer. Yes sir, the Air Force had a funding problem. The TF-41 engine option was exercised in May 1969 using Advance Buy funds and establishing July 15, 1969 as the date full funding would be required. On July 18, 1969, partial Navy funding was applied against the contract and an adjusted full funding date of September 15, 1969 was established. Following approval of the A-7E Program, the Navy provided additional funds on November 26, 1969 for its TF-41 engines. Additional funds were applied against the contract by the Air Force on December 24, 1969 after receiving approval on its fiscal year 1970 A-7D Program. Even with the Navy-funding activity, there were periods of time that the engine contract was not fully funded; however, this activity did serve to protect the Air Force portion of the option.

PREPARED QUESTIONS FROM SENATOR SMITH

Senator Symington. Senator Smith?

Senator SMITH. Mr. Chairman, I have no questions at this time, but I would like to submit some questions for the record.

Senator Symington. Without objection.

(Questions submitted by Senator Smith. Answers supplied by the Department of the Air Force.)

Question. General Ferguson, last year I strongly supported the AMSA (B-1) development.

You will begin awarding the first contracts this year.

My question is—what type of contracts have you in mind and what safeguards are you planning to avoid the problems of the C-5A?

Answer. Senator, let me first say that we greatly appreciate your support for the B-1 development program. We are making every effort to avoid the pitfalls and inflexibility associated with the Total Package Procurement Concept used for the C-5A. In this regard, we will employ cost plus incentive fee type contracts for the engineering development of the B-1. With this approach, changes can be made subject to mutual agreement, on a government controlled basis, without cumbersome re-negotiations. However, changes will be approved only after they have been critically examined by the Air Force for their cost savings and/or cost effectiveness. Further, we are not requiring the contractors to commit now to production prices that may not materialize for 7 to 8 years.

Our experience has also shown a pressing need for improving the management and cost control of new programs. We will depend upon two principal management tools for control of costs. These are management engagement with emphasis on costs and program control based on the demonstration of sequential technical milestones. We plan to subordinate engineering management as normally exercised and concentrate on a combined management/engineering approach with emphasis on cost control. As the inherent performance of an air vehicle is largely established early in the design cycle, the review of critical technical milestones in this early phase will insure the greatest inherent performance. Any large expenditure of dollars to meet required performance will be thoroughly evaluated before the contractor is given approval to proceed. Further, any proposed changes will require documented cost and schedule impacts as well as complete technical justification. Continuing management reviews will be conducted to assure the submittal and credibility of all necessary information. We also propose to control the release of funds to contractors commensurate with the attainment of technical performance milestones. The purpose of this control is to avoid spending large sums of money to meet a given program plan when a slippage in key milestones makes it impractical from an economic standpoint.

Question. General Glasser, you have listed the International Fighter under combat aircraft and you request \$30 million for procurement without a stated quantity. Here again you are asking for funds to buy an aircraft before you learn what it looks like.

I personally would prefer that the aircraft fly before you buv.

Would you comment on this.

Answer, Essentially, Senator Smith, as these candidate aircraft are derivatives of in-being aircraft, we already know most of their characteristics. There are four primary contractors who have indicated an intent to respond to the request for proposal. Each has a very similar aircraft flying today. Based on unsolicited proposals, our best estimates are that R&D may vary significantly depending upon which aircraft is selected. While fly before buy is something a desirable and attractive approach, it is not necessary here. In addition, our program time schedule to equip our Asian allies with this aircraft, and the high costs associated with prototypes, precludes pursuing this course of action.

Question. General Glasser, what is the total investment of the Government in the F-111 program to date! My question includes every model and version; R&D, procurement, and identifiable support costs.

Will you provide this for the record if you don't have the figures now!

Answer. Through FY 1970 the total amount the Government will have in the F/FB/RF-111 program for R&D, procurement, peculiar support, initial spares, and military construction will be \$6.78 billion.

Question. General, let us suppose that the F-111 contract had been total-package with the same pricing provisions that you have in the C-5 contract.

Could you comment on what the results might have been based on reduction of the number of aircraft being bought?

Answer. Of course this is speculation, but in my opinion the result would have been essentially the same with respect to a total-package contract. I say this because in a total-package contract the Air Force uses the results of Contract Definition to competitively procure, with one contract, Engineering Development and Production of the weapons system. Of course, the contract commits the Air Force to a specific delivery schedule and quantity for an agreed to price. However, if changes (such as quantity reductions) are subsequently directed by

the government, the entire contract is opened for renegotiation providing the contractor (who is now sole source) an opportunity to recover from any disadvantageous position he may find himself in from other causes.

Now, with respect to the pricing provisions of the C-5 contract, the results would also have been the same provided the same formula were used with same method of determining the price to be paid for follow-on quantities.

Question. General, the bulk of FY 1971 funds for missiles is in MINUTEMAN procurement. Are you prepared to discuss the reliability and the readiness of the current strategic missile force?

Answer. Yes. The current MINUTEMAN force consists of 500 MINUTEMAN I and 500 MINUTEMAN II missiles. The MINUTEMAN I system currently has a readiness rate or alert availability of [deleted] which means that over [deleted] of the MINUTEMAN I fleet is available for launch at any given time. The weapon system reliability, which is a compilation of alert availability, launch reliability, in-flight reliability and warhead reliability is [deleted] which means the about [deleted] of the MINUTEMAN I fleet will detonate a warhead on target when called upon to do so. The MINUTEMAN II alert availability rate is currently [deleted] or, put a different way, [deleted] of all MINUTEMAN II missiles are in commission at any time. The MINUTEMAN II countdown and flight reliability is presently demonstrated at [deleted] but is estimated to be [deleted]. The difference between these two numbers is caused by removing failures from the demonstrated data when fixes are known and scheduled for incorporation.

Question. General, the Air Force is embarking on a sophisticated program for Navigator training. What was the basis for selection of the DC-9 to fill this requirement?

The request is \$39.3 million for four aircraft. What is the cost of the equipment going into each aircraft?

Answer. Actually the DC-9 has not been selected. We plan to conduct a competition for an existing FAA-certified medium jet aircraft of the Boeing 737/McDonnell-Douglas DC-9 type. Specifically it will be an aircraft with the capability to accommodate 12 undergraduate navigator students, four navigator/bombardier students maintaining navigator proficiency and three instructor navigators.

While cost was the primary consideration in selection of this type aircraft, the aircraft performance with regard to the operational requirements, its ability to accommodate the necessary navigational equipment and the opportunity for each student to perform an adequate proportion of his training as lead navigator were also considered.

These particular aircraft have demonstrated outstanding performance in terms of high utilization rates, low maintenance and operating costs and overall reliability, and are the most effective from both the cost and training standpoints.

The cost of the specialized equipment for Undergraduate Navigator training going into each aircraft is \$3.830 million for a FY 1971 total of \$15.320 million.

Question. When will the A-7s begin entering the Air Force inventory? More precisely, what is the delivery schedule for these aircraft?

I am speaking of those procured in FY 1970 and those in this year's budget.

Answer. The first A-7D was delivered to the Tactical Air Command in August 1969 as part of the FY 1968 buy program. The FY 1969 buy program is now being executed with deliveries through December 1970, resulting in cumulative deliveries of 74 aircraft (64 TAC aircraft and 10 test aircraft). The 1970 buy program provides for deliveries to begin in January 1971 at a nine per month rate through February 1972, plus two aircraft in March 1972. The delivery schedule for the FY 1971 buy program provides for seven aircraft to be delivered in March 1972 with a continuing rate of nine per month through December 1972.

MANAGEMENT RESPONSIBILITY

Senator Symington. Senator Cannon?

Senator Cannon. General, getting back to this management concept. I am not sure that I exactly understand what the difference is in the management concept now than what it was prior to this time. For example, didn't your program managers have the authority before and weren't they held directly responsible for these programs?

General Ferguson. They could not exercise the authority that they have been given, Senator Cannon. If you look at the charts of the way things were going 5 years ago and today, you may not see very much change, but any one of the eight program directors behind me will tell you that he has seen a remarkable change in his position and his opportunity to exercise control over the program within the last year by virtue of the emphasis downward into the field.

Senator Cannon. In other words, he has more of the decisionmaking

process?

General Ferguson. He does, and he has much more explicit direction as to what his authority is, and in what form he will report, and how often he will report on his progress.

Senator Cannon. Who had that authority prior to this time?

General Ferguson. There is really not much change in authority. It is a matter of delegation and agreement to permit the exercise of authority. The Secretary of Defense, of course, can manage in detail if he wants to.

Under the current circumstances, particularly Under Secretary Packard has made it clear that he wants to approve the scope of the program, and its objective and the funding associated with it. Then he wants to see the man to whom he can look to manage that program and report to him periodically. This is a different approach than we have had in past years.

Senator Cannon. Who was actually carrying out that management

responsibility prior to this time?

General Ferguson. We still have the same kind of a program office, but he was completely responsive to the direction received from several layers above him.

Senator Cannon. In other words, you had managers from the

Secretary of Defense all the way down; it that it?

General Ferguson. Yes, except in my headquarters it was pretty

well bypassed for a number of years.

Senator Cannon. If this is such a much better procedure, why wasn't it adopted before? Has this been recommended prior to this time?

General Ferguson. It did not have to be recommended really. It was the principal reason for the organization of the Systems Command in the first instance, and that was to manage, research, and direct the development and production of programs as approved by the Defense Department and the Air Force.

It is just a matter of personalities, you might say, or of the times in which there was concern about the overall capability of the Defense Department to manage. There were those at high levels who thought that perhaps they had better become more involved to assure proper

program direction.

Senator Cannon. Are you satisfied that your program managers in each instance have the authority that they need now to get the job done, and that if they don't get it done that you can hold them personally responsible without that going all the way up to the top?

General Ferguson. I am satisfied that this is the case. All of them told me just yesterday that they feel they have the authority to man-

age the programs.



SHORT-RANGE MISSILE PROGRAM FUNDING

Senator Cannon. General, do you feel that the Congress should fund—maybe some of these questions should go to General Glasser—should fund both the Air Force's short-range missile program and the Navy's short-range missile program this year, recognizing that Mr. Packard will make a decision sometime this summer, and that only

one program will go forward after that time?

General Ferguson. I would like to reply to that, Senator Cannon. I would like to say here first of all, because it is pertinent to the answer, that I have excellent and close-working relationships with my counterpart in the Navy. When this subject of the short-range missile was raised, there was a question in the Defense Department as to whether or not the Navy and the Air Force ought to proceed with the two parallel programs.

I met with my Navy counterpart, Admiral Gallantin, and then we proposed to Mr. Packard an arrangement whereby we could get the

best out of both services' capabilities as a next logical step.

What we have done is this. We, with full agreement of the Navy, have gone forward to the contractors, asking for responses to a proposal to develop a missile of a capability that would be useful both on the F-14 and the F-15. We have set milestones so that both we and the Navy will take a look at the responses. Concurrently the Navy's ordnance test facility at Inyokern, in California, is doing related work for the Navy, so that around the first of July we, the Air Force and the Navy, will take a look to see what makes sense collectively to go ahead.

The current plan is then to introduce competition by way of carrying two contractors forward, and hopefully with missiles that have complementary capabilities, to the point where they demonstrate to us that they have a missile that will perform the functions that we want. At that point then we would select one to proceed into production.

So really we have a parallel effort for our mutual benefit at this stage in the game, with relatively little money involved, and with assurances that we have the right technical approach when we commit

ourselves for production.

MISSILE MODIFICATION

Senator Cannon. Do you personally favor the modification program for the FALCON and SIDEWINDER programs, recognizing the Air Force will spend in excess of [deleted] million to modify the FALCON of which \$15 million is requested in fiscal year 1971, and in addition you are going to spend [deleted] million to modify [deleted] SIDEWINDERS of which almost \$17 million is requested in fiscal year 1971?

General Ferguson. As a general comment, Senator Cannon, I am opposed to changes of that general category, but let me ask General

Glasser to answer the question more specifically.

General Glasser. I think I need to narrow the question, Senator, if I may.

Senator Cannon. All right.

General GLASSER. So far as the modification of the SIDEWIND-ERS, well, I think the answer is simply, "Yes." I do favor the program as presented.

Senator Cannon. Go ahead with your explanation there. You

started to break it out.

General GLASSER. What are we doing with the AIM-9 SIDE-WINDER in the first place, since this is an interim missile, is to improve it to give us a close in high maneuvering dog fight capability prior to the time that we will have the AIM-82 that General Ferguson

spoke of a bit earlier.

Senator Cannon. The Air Force testified before our subcommittee that it did not feel it could train its pilots with the older SIDE-WINDER and FALCON models, but felt it was necessary to train them with the most modern FALCON and SIDEWINDER assets. Now that is going to result in a critical shortage, with the modern missiles. Why couldn't the Air Force train with the older models at this time?

General GLASSER. I am not able to answer that, Senator. I have to rely on the operational people who have looked at these considerations. It is their conclusion that the environment is sufficiently different so that they have to fly in the envelope of the newer missiles.

Senator Cannon. You may elaborate for the record.

General Glasser. I would like to elaborate.

(The information follows:)

The Air Force believes that it is essential to train its pilots with the air-to-air missiles they will use in combat if the combat missiles have launch envelopes significantly different from those of older, tactically inferior weapons. Moreover, we combine our training and weapon system evaluation programs to conserve missiles and obtain important performance data on our first-line missiles during the training exercises. These training and evaluation programs are not the cause of our missile shortages.

The critical shortage of missiles is caused because we are unable to operate the inferior AIM-4D FALCON and AIM-9B SIDEWINDER from F-4 aircraft. The AIM-4D-8 FALCON compatible with F-4D/E carriage, and although its tactical performance [deleted] is deficient, we have used this missile for training. We intend to continue using any remaining AIM-4D-8 even after the improved AIM-4H FALCON becomes available. The only other infrared missiles that may be used with the F-4 are the AIM-9E SIDEWINDERS. Therefore, the Air Force has on hand a larger number of unusable AIM-4D and AIM-9B missiles and is faced with a critical shortage of usuable tactical missiles.

The Air Force studied this problem more than a year ago and concluded that the best means for near-term correction of these problems was to modify the maximum number of the existing unusable AIM-4D/AIM-9B assets. This alternative was superior to all other alternatives based on performance and availability and was significantly cheaper. This conclusion has been recently reaffirmed by the Air Force and we believe that both the AIM-4H FALCON and AIM-9J SIDEWINDER modification programs are vital to our near-term air-

to-air missile needs.

REDUCTION IN MISSILE PROGRAM

Senator Cannon. When did the Air Force reduce the MAVERICK requirement from [deleted] to [deleted] missiles?

General Glasser. This has occurred just within the past month. Senator Cannon. And was the basis for that reduction the Secretary's statement that we were planning now for a 1½ war strategy vis-a-vis a prior 2½ war strategy?

General GLASSER. I don't think that this is a direct consequence of that, no sir. It is a review of the fighter force and the equipage that was considered to be necessary. We are presently planning to preserve the same procurement program during the early years, so that the option of procuring more is always available to us.

Senator Cannon. Do you have a breakout point at which the MAV-ERICK would not become a cost effective missile or missile program

on the numbers that you propose to buy?

General Ferguson. I can ask Colonel Rushworth, the program director, to respond to that question.

Colonel Rushworth. I have a breakout of the costs, but I do not

have it by the cost effective position.

The cost effective paper that was accomplished is approximately 2 years old at this time, and the figures in that indicate down to a certain level, and it is at the [deleted] level where we are right now that it is still cost effective.

Senator Cannon. Will you have to renegotiate your contract with

the contractor as a result of this change in objective?

Colonel Rushworth. There will be a renegotiation of a sort within the contract to get to this [deleted] level. We do have the capability within the contract to accept or procure [deleted], but some minor changes in the contract do have to be made.

Senator Cannon. Thank you.

ELIMINATION OF DUPLICATED PROGRAM

General, the Defense Department has been studying for several month's the Navy's WALLEYE missile and the Air Force's Mark 84 for possible duplication, and with the objective of eliminating one of these missile programs. Do you feel that those missiles are competitive, and do you feel that one of them should be eliminated?

General Glasser. First of all, Senator, we don't consider these as

missiles. These are free fall weapons.

We have been discussing this with the Defense Department for quite a period of time. It continues to be the Air Force's position that the Mark 84-EO bomb, which is approved for production is the most economical and is our preferred weapon. It may require some minor

modifications for shipboard use.

The Defense Department has been asking the Navy to look at an adaptation of that weapon for shipboard use, and to see what the costs of that would be. It has not been resolved at this time, so that I can't give you a specific position except to say that we firmly believe that the Mark 84-EO should continue to be procured for the Air Force, and if feasible should be adopted for Navy use. It would be our view that it should be bought as a common item for both the Air Force and the Navy.

TRANSFER OF MISSLES TO NAVY

Senator Cannon. In our hearings it was developed that the Air Force would have [deleted] WALLEYE in inventory and had planned on shooting them all up in training test exercises. Now when you consider that that costs about \$20,000 each, that does not seem to be a very good training program when you are not going to get any more.

In view of that, wouldn't it be better for the Air Force to transfer those assets to the Navy, particularly if the Navy is going to go

ahead with the program?

General Glasser. As a matter of fact it is my understanding that a major fraction of those will be considered for transfer to the Navy. I will have to examine the testimony that you referred to. I will add to that if I may at that time.

(The information follows:)

The projected training and test projects on WALLEYE will consume a relatively small number (less than 100 per year) of our inventory. The primary requirement we have for the approximate [deleted] inventory weapons is as a substitute item for partially satisfying the current WRM requirement of Mk-84 electro-optical guided bombs. Due to funding restraints in the munitions area, our approved production program for the EO guided bomb essentially will satisfy only SEA requirements. Pending the availability of additional funds and/or the cessation of SEA hostilities, our WALLEYE inventory must be maintained as an interim substitute for the Mk-84 EO guided bomb. WALLEYE production for both USAF and NAVY is scheduled to complete in late CY 1970; to our knowledge, OSD currently has not approved any WALLEYE production beyond that date. A quantity of [deleted] WALLEYES from the Air Force Martin-Orlando production, scheduled for March and April 1970, will be [deleted.]

LACK OF CLOSE AIR SUPPORT ABILITY

Senator Cannon. I would like to turn to the A-X for a moment. General, specifically why can't the A-7 perform the close air support role and thereby eliminate the A-X requirement?

General Glasser. The primary reason for that is the performance envelope of the A-7 which does not allow for operation in very close proximity to troops, in a very unfriendly environment. Senator Cannon. Would you say that again?

General Glasser. The speed regime of the A-7, the maneuvers that must be performed for ordnance delivery are felt by most people to be unsatisfactory in close proximity to troops, where you have to lay weapons down right alongside them. Also, survivability features are designed into the A-X which will allow it to operate in that sort of an environment at low altitude

A-X AIRCRAFT

QUANTITY

Senator Cannon. How many A-X aircraft does the plan call for and how did you arrive at that number?

General Pirrs. It calls for a total buy of [deleted] aircraft, [de-

leted] wings and [deleted] squadrons.

General Glasser. Could you describe, General Low, the location of these squadrons in the Regular versus the Guard?

Senator Cannon. They are carried at below the line. They are not

in the 23 wings; is that right?

General GLASSER. I have it here. There will be [deleted] squadrons to be in the Active Force, [deleted] squadrons to be in the National Guard, and [deleted] squadrons to be in the Special Operating Forces.

CLOSE AIR SUPPORT

Senator Cannon. Your previous response to the question of close support raises a question in my mind when General Ferguson in his

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statement says the requirement for the Air Force A-7D aircraft stems from the responsibility assigned to the Air Force, that it would provide close air support to Army field units.

General Glasser. That is correct.

Senator Cannon. Is that consistent with what you have said about the A-X?

General Glasser. I believe it is, sir; the A-X is a special purpose airplane for the very close support role, whereas the A-7 will be used when it can be generally for the longer range mission; the A-X being reserved for those very unique requirements of the troops in contact.

ESTIMATED COST

Senator Cannon. In view of the fact that the A-X is supposed to have come along with principally off-the-shelf components and existing technology, why is the total estimated R. & D. cost so high?

General Glasser. The R. & D. cost being approximately \$195 million is broken into two elements. The first \$60 million or thereabouts is for the prototype development by two contractors of two aircraft apiece. The residue of that money is then for the development and testing program requisite to put one of those airplanes into production. A significant fraction of that money is involved in buying test airframes and flight testing which has been ruled to be procured out of R. & D. funds.

Senator Cannon. What would you do with the fiscal year 1971 money which is \$27.9 million?

General Glasser. This will allow us to initiate the development of

the prototypes by the two contractors.

Senator Cannon. Do you believe that the A-X is or is not competitive with the Cheyenne helicopter in this close air support role which

you have defined?

General Glasser. If they were both to be put into production they would be competitive. They would be complementary and almost automatically competitive.

Senator Cannon. General Ferguson, do you have any feel as to whether Congress should fund both of these programs, recognizing that they are competitive, and they are going to be performing the same role?

General Ferguson. Senator Cannon, I am now in the position of responding to direction to develop systems. I can't give you a useful response to the relative capabilities and requirements. I am not familiar with the capabilities of the Cheyenne.

General Glaser. If I may add to that, Senator Cannon, expanding my previous answer, I believe that it would be prudent to pursue the development of both vehicles, waiting for that evidence to be available before making a decision on selecting one for production.

BOARD RECOMMENDATIONS ON F-111 ACCIDENTS

Senator Cannon. Turning to the F-111 now, what did the Scientific Advisory Board recommend with reference to their inquiry relative to the recent F-111 accidents?

General Ferguson. I can give you a general reply if I may, and I would like for General Esposito to follow, Senator Cannon.

The Board met in early January, examined in minute detail for a number of weeks all the evidence relating to the accidents of mid-December last, formulated subpanels to canvass the entire aircraft industry and forging industry to determine the process that was used in the development of the component that failed on the airplane in

question.

Having done this, and having examined carefully the other applications of the steel in question, used in the component that failed, then this Scientific Advisory Board looked at the alternatives to determine how we can inspect components more accurately to assure that there are no flaws in any forgings, the Board looked at the various options open to us in testing the aircraft and the components, to assure that any flaws that might not be detected by test devices would be uncovered as a result of static load tests applied to the airplane. So the recommendations generally are these:

That the aircraft should be subjected to the full load tests of 7.33 G's plus under conditions of very cold temperatures like minus 40 degrees before they are released for full operation again. This is the program

which we are following right now.

Senator Cannon. And you are building special cells?

General Ferguson. We are building three and perhaps four cells. Two at Fort Worth and one at Waco, and we are considering a fourth

at one of the Logistics Command depots.

It is a king size box, if you please, into which the airplane is put. It is cooled and then the wings are loaded to simulate high altitude temperature, high G loadings. Under these conditions we feel that coupled with all the tests that we are subjecting the critical components to, we would detect and uncover any flaws in the material.

PROGRAM COSTS

Senator Cannon. Do you have an estimated cost of that program?

General Ferguson. Let me ask General Esposito.

General Esposito. Yes, sir. We are estimating about \$31 million total with the recurring costs for each aircraft subjected to the inspection and the proof test at about \$70,000.

Senator Cannon. \$31 million plus the \$70,000 per aircraft?

General Esposito. \$70,000 is on a unit basis. The \$31 million is on a total basis and covers the nonrecurring as well as the recurring.

Senator Cannon. Thank you, Mr. Chairman.

Chairman STENNIS. Thank you very much, Senator.

Gentlemen, Senator Byrd will be next. All right, Senator Byrd.

Senator Byrd. Thank you, Mr. Chairman.

C-5AS IN SERVICE

General, I notice that your statement says that there are 13 C-5A aircraft that have been built. The Air Force has accepted six. Now are all of those what you call production C-5A or are part of them R & D.?

General Ferguson. Part of them are R. & D., Senator Byrd.

Senator Byrd. How many operational aircraft, C-5As do you have,

have you actually received?

General Ferguson. We have accepted five development test airplanes and have taken delivery on seven more.

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Four of the seven are in the hands of the Military Airlift Command now training pilots and three of these seven are also in the test program. The remaining aircraft is being flown by an Air Force acceptance team at Lockheed prior to taking delivery.

Of those 13, several of them have been put back into modification

facility for the updating and repair of wings.

Senator Byrd. I want to see whether your statement is in tune with yesterday's statement that there are 3 what you would call production C-5A, that you have 3 production C-5A.
Colonel Вескман. Sir, as of today there are 4 production C-5As

that have been delivered to the Military Airlift Command.

Senator Byrd. There are 4 production?

Colonel Beckman. They are not all completely configured because we simply have not finished the testing on all of the systems.

Senator Byrd. How many are completed?

Colonel Beckman. We have taken delivery on 7, sir. Three are in the category II testing, the R. & D. kind of testing, and 4 are in the hands of the Military Airlift Command.

Senator Byrd. Four are in the hands of the Military?

Colonel Beckman. Yes, sir. Two of those are being updated with the wing fix.

Senator Byrd. Thank you.

C-5A OPERATIONAL SCHEDULE

Now I want to go back to last June. You were not testifying. General Crow was testifying, but I want to read just a little bit from this testimony of last June, which is 9 months ago. I asked this question. The question is this, and I asked General Crow this:

When the C-5As become operational, how many aircraft will be taken out of action?

In other words, how many aircraft will be replaced? Now we come down and General Crow gives some answers to that question, but then the Chairman, Senator Stennis, interrupted, and he said this:

If the Senator will yield to me I think the Committee is entitled to a specific answer from the General on that and I hope you will present a statement. General Crow. I will, sir.

Now here is the statement that is inserted in the hearings on page 2049. Although it is about 5 sentences long, I think I will read that, because to my mind it does not answer the question at all, and if it does not answer the question, I would like for you, if you will, General, to submit an answer. Let me read it. We will get back to my original question that I asked General Crow last June. The question is this:

"When the C-5As become operational, how many aircraft will be taken out of action?"

The answer submitted after the committee hearings, which is on page 2049 of the committee hearings, is this:

The phase down of aircraft from airlift forces began in 1966 when OSD approved the objective of the 6 squadron C-5A program. Implicit in the decision was the planned phase-out of obsolete types of aircraft from the Active and Reserve Forces and the curtailment of other new aircraft procurement schedules which provided substantial savings to justify procurement of C-5A aircraft. The total number of aircraft removed from the Active and Reserve Strategic Airlift Force over a 7-year phase-down period is the 914.

That is not the question that I asked at all, it is not the question that the Chairman asked. I would like to ask you if you would have someone on your staff review this page 2049 of last June, and submit an answer for the record as to when the C-5A's become operational, how many aircraft will be taken out of operation.

General Ferguson. I understand the question, Senator Byrd. If I may I would like to turn this over to General Glasser, because this is

an Air Staff kind of question.

General Glasser. We will supply an answer for the record.

Senator Byrd. Thank you, sir, because I don't feel that the answer that was supplied that I just read is responsive to the question.

(The information follows:)

Overall planning for airlift forces called for phase down and phase out of a total of 914 aircraft as shown below:

Phased out prior to IOC:	
C-124	161
C-97	122
C-121	62
C-135	29
C-133	11
Subtotal	385
Reassigned prior to IOC:	
C-130E	123
Reduced buy prior to IOC:	1-0
C-141	107
Total	615
Phase out/reassign after IOC—Phase out after IOC to full equipage:	
C-124	124
C-133	31
C-97	36
C-124	63
Reassigned:	
C-124	45
Total	914
Timing for these actions cover periods before and after the introduction the C-5. The specific aircraft which will be phased out or reassigned after currently planned IOC for the C-5 are:	
C-124	232
C-133	31
C-97	36
Total	299

SRAM MOTOR

Senator Byrd. I would like to get a little understanding of the SRAM missile motor program. I am going to read a couple of statements and ask you whether this is accurate or not. This is the one which is the subcontractor from Boeing.

General Glasser. Lockheed is the motor subcontractor.

Senator Byrd. That is right. The original contract price was \$5 million, but following Government approved changes, this was raised to \$23 million, with what was believed to be an absolute contract ceiling of \$26 million. Are those facts accurate?

General Ferguson. Let me ask Colonel Falk.

Colonel FALK. The numbers are these. Boeing is the prime to the

Air Force, and Lockheed is a sub to Boeing.

In a report we have received from Boeing as of the 15th of February 1970, they say that the basic target was \$5 million roughly. They estimate that the final target, at least as of that time of changes that Boeing has approved for Lockheed, will bring the target to \$23 million and it will bring the estimated final ceiling to \$25.866 million.

Senator Byrd. That is the absolute ceiling?

Colonel FALK. Right, as estimated by Boeing, because Lockheed is

a subcontractor to Boeing.

Senator Byrd. To date Lockheed claims it has spent \$47 million, and expects to spend another \$15 million before finishing the scheduled work. Is that correct?

Colonel Falk. Again using this report from Boeing, Boeing's estimated anticipated final completion cost is \$64.493 million, and as of through December they were saying that the subcontractor reported an actual \$49.618 million, so it is actually higher than \$47 million.

Senator Byrd. Mr. Chairman, thank you. I will yield back the rest

of my time.

Chairman STENNIS. Senator Dominick.

F-111 WING STRUCTURE

Senator DOMINICK. General, why are we buying more F-111s when we continue to find it necessary to ground them? Under Secretary Seamans' testimony, which I have reviewed, the new box for the wing structure won't even be ready before 1972, and yet we are going to buy the ones with the bad box in them in fiscal 1971.

General Ferguson. The bad box is a phrase that is not exactly accurate if I may say so. Actually the modifications that we have made to the aircraft that are currently in hand are going to give us an airplane that has a reasonably useful life until a completely new box

is designed and tested.

We are in the process of testing modifications to the current box. The results are very encouraging. I would like to ask General Esposito

to tell you about that.

With respect to the buy program as you know it has been cut down, as Senator Symington pointed out, down to four wings of tactical fighters now, and the request in the 1970 and 1971 budget is just sufficient to round out those four wings that we are looking for. But let me ask General Esposito to respond directly to your question.

Senator Dominick. Before you do, I call your attention to page 8 of Secretary Seamans' testimony, which I have before me here, saying that "investigation has established the cause of the December accident as a structural failure resulting from a material flaw in the wing pivot fitting. We have identified the manufacturing process that probably caused the crack and have also established how such a flaw could have escaped detection. While we believe this to be an isolated occurrence we are proceeding on the assumption that such defects may exist on similar structures throughout the fleet. We are presently developing corrective actions which include a complete inspection of the wing pivot fitting," et cetera.

Then he goes on to say "it is important to differentiate this problem, which involves a material defect in a wing pivot from the structural fatigue problem of the wing carrythrough box that has been discussed in the past month. We are designing a new box which we anticipate will provide more than 4,000 hours of fatigue endurance. This new box will be incorporated initially in the F-111F aircraft, and installed in the earlier aircraft during schedule inspection and repair cycles starting in mid-1972."

Yet the clear statement is that we are buying F-111Fs as the maximum number in fiscal 1971, some 40 of them, while we know already we have got a problem, and which we haven't solved. Now why are we

doing that?

General Ferguson. Because we are putting a fix into that box, Senator Dominick, but let me if I may ask General Esposito to explain

to you in detail what actions are being taken.

General Esposito. Senator, the program about a year ago when we first identified the causes which had caused the box to fail early in terms of endurance, at that time we concluded that we had approximately 1,600 hours of good useful life which would allow the airplane to fly its entire design mission. Sixteen hundred hours would allow us something like 4 years of operational life. We were looking for 4,000.

Now, at the time that we came up with that conclusion, we immediately implemented a program for the new box, the one that Secretary Seamans refers to being effective initially in the F-111F aircraft.

Now, that box is being designed to give us somewhere between 4,000 and 6,000 hours of endurance. As a result of the experience we had about a year ago, we have identified the causes which caused the box to fail early, the one that you referred to that we are putting in airplanes that we are now building. That was the 1,600-hour box.

The testing of that modified box, which started in December, is now up to where we have 3,000 hours of life as opposed to the original 1,600 hours, so in referring to General Ferguson's comments that the box is not really a bad box, we are now from 1,600 to 3,000 hours.

Now, we had proposed starting in 1972 when we were talking about a 1,600-hour-life box, to put this new one in, that is the one we are designing and going initially in the F-111F. We still propose to do that, but depending on how much success we have with the tests that are now underway, where we now have 3,000 hours, depending on how much success we have with that, we may have to, we may elect to adjust our planning later and not incorporate the new box in some sort of a retrofit program.

To put the new box in retrofit, that is all of the airplanes that have been delivered prior to the new box effectivity, we estimate something like about \$150,000 an airplane. That includes the new box and the cost of incorporation. That is the cost we would avoid if we find that the current fixes that we are testing show that we do not need to in-

corporate the new box.

I recognize this is involved and I keep referring to two boxes, but that is about the pattern that we are in as of today.

NEW F-111 CONTRACT

Senator Dominick. General, I had thought that we were just about completing our F-111s in the buy for fiscal 1970. The 40 that we are calling for this fiscal 1971, does that require a new contract?

General Ferguson. Yes, that is right.
General Esposito. Yes, the 40 aircraft are in a follow-on contract, sir. There are 58 of the F aircraft that are being procured under the current contract, and the 40 in the follow-on would complete the one wing of F's that we are planning.

CONFLICT IN AIRPLANE BUYS

Senator Dominick. I really have a hard time finding out why we are going ahead with the 111s when we can't make them fly and they seem to have structural failure besides, but maybe I will get into that a little bit later. I was interested in your statement, General, on the A-7. Having been opposed to the purchase of the A-7 last year and arguing strenuously that it wasn't going to perform the mission that it was supposed to, I rather gathered from what you have said that it doesn't perform the mission it is supposed to, namely, that it is not the close-in air support weapon that you are going to need. Now you say you want the A-X.

General Ferguson. You are addressing that question to me, sir? Senator Dominick. Yes, sir.

General Ferguson. Well, you will recall the history of the A-7.

Senator Dominick. I recall the history that we bought it because someone said we wanted x number of airplanes and therefore we ought to buy this even though the F-4 or something else would be better.

General Ferguson. Originally the airplane was considerably cheaper than the F-4. It was an airplane though not supersonic, it had tremendous weight-lifting capability in terms of ordnance and loiter capability, and good handling qualities, and in a complementary role it could play a very useful purpose in our tactical support role. When I say tactical that involves close support, interdiction and related types of missions. I think the airplane was proven out to be a very good ordnance delivering aircraft. We find that in our category 2 testing. It is true that it costs more than we originally intended, and the major reason is that we are asking that it have greater capability than we originally intended.

Senator Dominick. It costs about \$3.5 million per unit now, did I

understand you to say?

General Ferguson. It averages out to be that, yes, over the entire buy. General Glasser. The program cost.

F-4E UNIT COST

Senator Dominick. What is the F-4E, on a unit basis now?

General Ferguson. On a comparable basis it is more than that. I will have to look at the record.

General Glasser. It is difficult to compare them on the same basis. sir, because the basic development of the F-4 program has been covered through the Navy programs in prior years. It is not included in what we look at as the unit program cost of the Air Force buy of F-4's.

Senator Dominick. If you were buying an F-4E now what would it cost you?

General Glasser. As a recurring cost to buy an additional increment of them?

Senator Dominick. Yes.

General Glasser. \$3.6 million a copy.

Senator Dominick. \$3.6?

General Glasser. Yes, sir. Senator Dominick. Compared with \$3.5.

General Glasser. Sir?

Senator Dominick. As compared with \$3.5 in the A-7.

General GLASSER. On that same basis, an additional incremental unit of the A-7 is approximately \$2.3 million. The \$3.6 million A-7 program unit cost is arrived at by adding development, production, initial spares and construction costs, then dividing that by the number to be bought over the entire program. If we are asking what is the cost of an incremental additional airplane, it is running around \$2.3 million for the A-7 as opposed to \$3.6 million for the F-4E. The high cost of the F-4 in the outyears is due to the extremely low production rate of two aircraft per month.

RADAR CAPABILITY

Senator Dominick. In the design capability of the F-15, are you

putting in terrain following radar?

General Ferguson. There is down looking capability in the radar but not terrain following; no, sir. It is not designed to be operating in that area although it might under certain circumstances.

Senator Dominick. That is what I had understood, that it was supposed to be an air superiority fighter and then I understood you

were putting terrain following radar in it.

General Ferguson. Let me ask General Bellis about the capability

in down looking on the radar.

General Bellis. Terrain following being a navigational type device it is more for penetration. It is not in the F-15 program. We have a look down capability for air superiority for look down shoot down in case the other air vehicle or opponent is below us, so that the ground clutter does not obliterate our target, but it is not a terrain following radar.

Senator Dominick. Mr. Chairman, I have a number of questions that I will want to ask here, and maybe I could submit them for the record, but I would like to ask just two or three verbally here.

Chairman Stennis. It is all right to ask two or three more.

RADAR TECHNOLOGICAL RISK

Senator Dominick. How much technological risks remains in the development of an AWACS radar which can reliably track low flying targets against the background of ground clutter?

General Ferguson. Our experiments so far has given us confidence that we are ready to carry it the next step. We have had satisfactory results from the several models that we have tested over the years, and as you probably know, Senator, we are in the process now of selecting one contractor who will flight test two different radars before we move beyond that into production of any number. I would like Colonel Russel who is the program director to respond to your questions specifically, what confidence do we have.

Colonel Russel. Beyond completing scale tests in the overland radar technology program we have built components of the full scale radars, antennas, certain parts of transmitting aim and certain critical aspects of the Doppler processing techniques. We have the results of those tests which have all been encouraging.

In addition we have built full-scale radomes to get the match of the effectivity of the radar with the radome playing together with the antenna

The next logical step is to test the full-scale capability at jet speeds and altitudes and only that will be the proof of the pudding that we indeed have effective surveillance over land radar.

Senator Dominick. Will it be able to discriminate between aircraft

and sophisticated penetration aids like SCAD.

Colonel Russel. The question of ECM is one of degree, that it will incorporate certain ECM countermeasures of its own to overcome such techniques, but I wouldn't say categorically that it will not have a complete ECM or ECCM capability.

PREPARED QUESTIONS FROM SENATOR DOMINICK

Senator Dominick. Mr. Chairman, in order to speed this up, I will submit these other questions and ask that they be answered for the record.

Chairman Stennis. All right, I thank you very much.

(Question submitted by Senator Dominick. The answers supplied by the Department of the Air Force.)

Question. How much technological risk remains in the development of an AWACS radar which can reliably track low-flying targets against the background of ground clutter?

Answer. The technical feasibility of obtaining sufficient clutter rejection for the overland detection of low-flying aircraft was demonstrated in the Overland Radar Technology program in 1967-1968. It was widely recognized that much development was still required in order to transition from that technical feasibility demonstration to the demonstration of a full scale radar on a full sized jet aircraft. During the last year, considerable progress has been made toward that objective. Both radar contractors, Hughes and Westinghouse, have built fullscale antennas, demonstrated critical high power components in the laboratory, and accomplished significant radar simulation. The two potential prime contractors, Boeing and McDonnell-Douglas, have built full scale radomes. A full scale Westinghouse antenna has been mated and tested in a radome and the Hughes antenna is currently undergoing tests. All informal reports indicate that performance equal to or better than predicted performance is being achieved. While these test results are encouraging, it is recognized that the problem of developing a full scale radar and installing it in a DC-8 or 707 and obtaining adequate performance to support the AWACS mission will still require major developmental work. The technical risk is still sufficiently great to warrant developing and flight testing two competitive radar designs, Hughes and Westinghouse, installed in modified versions of either the DC-8 or 707, depending on whether McDonnell-Douglas or Boeing wins the system competition. Thus the AWACS program to be pursued with FY 1971 funds is aimed at the first major objective of demonstrating the adequacy of the radars prior to proceeding with full AWACS development.

Question. Will the radar be able to perform this look down tracking function over land by automatically eliminating the ground clutter or will it be highly sensitive to operator skill?

Answer. The AWACS radar is to have the ability to automatically detect and track low-flying aircraft. It will not be highly sensitive to operator skill.

Question. What capability will this radar have to discriminate between bombers and sophisticated penetration aids such as our own proposed SCAD?

Answer. The design of the SCAD has not been finalized to the degree that will permit an elevation of the capability of the AWACS to discriminate between it and a bomber aircraft. The characteristics and the specific composition of the electronic decoy package of SCAD are still under investigation by the Air Force and its study contractors. The SCAD decoy package concept envisions a capability to counter [deleted] Soviet area defense radars. Frequency bands, power levels, scintillation and antenna coverage trade-offs will be made to optimize the decoy effectiveness against the Soviet threat radars. The techniques SCAD will employ include jamming, signal augmentation and possibly false target generation. It would be expected that if the design objectives of SCAD are achieved, it would be difficult for AWACS to discriminate against it under certain conditions. It would also be expected that at certain ranges and at certain aspect angles, the radar return from a bomber would be large enough that the AWACS radar could discriminate between the bomber and the decoy. That performance cannot be calculated at this time due to the uncertainty in the SCAD characteristics.

It can be reasonably assumed that if the Soviets were to develop a SCAD-like vehicle they too would optimize their ECM package to counter the U.S. ground and airborne radar threats as they perceive them. Their goal would be to design a decoy package which would reduce the ability of our defense to discriminate between the decoy and their bomber. Certain tactics and techniques are available to our AWACS system to discriminate between the decoys and the bombers or to reduce their effectiveness against our defense radars. For example, it may be possible to position our AWACS and interceptors sufficiently forward of the enemy targets that the bombers would have to launch decoys early. The decoys would then run out of fuel and not provide decoy protection all the way to the target. Additionally, [deleted]. Operational procedures that would be selected by our AWACS would depend on knowing the range capabilities of the decoy and its ability to apply sufficient electronic countermeasures techniques to dilute the capability of our AWACS. [Deleted.]

Question. Does the FY 1971 funding request for AWACS R&D include a provision for aircraft on which the brassboard models can be tested?

Answer, Yes.

Question. If funds are requested for aircraft, how many aircraft will be procured and at what programed cost?

Answer. It is planned to buy two reconditioned aircraft for the radar development program, one with the Hughes radar and one with the Westinghouse radar. The two aircraft will cost approximately \$7 million. An additional \$31 million will be spent in FY 1971 to modify the two aircraft with rotodomes (30' diameter by 6' thick) plus other modifications required to make them suitable testbed aircraft for a radar competitive flight test program.

Question. It is our understanding that the AWACS as presently conceived has a reduced capability from the system proposed as late as last year. Would you define the differences in the capability; give the reasons for reducing the capability proposed and the dollar impact involved in accepting a less capable system.

Answer. The differences between the AWACS as currently conceived and the AWACS under consideration a year ago are illustrated on a chart provided to the Committee. The core configuration is the one being considered for development. It represents the Air Force's latest analysis as to what is needed to satisfy both tactical and air defense roles in view of the current NIPP threat. The configuration referred to in the table as the "RFP" configuration is the one that was under consideration a year ago. The configuration referred to as the Potential configuration is an indication of the growth capability of the "core" configuration and represents the increased capability that could be achieved by the addition of additional identical equipments if changes in the threat or operational experience with the "core" configuration reveals that an increased capability is necessary.

After receipt and evaluation of the contractors' proposals, the Air Force estimated that the development and procurement of the AWACS program being considered last year [deleted] systems with the RFP configuration) would have cost \$675 million more than the currently proposed program [deleted] systems with the "core" configuration.

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CONFIGURATION AND PERFORMANCE

	Alternative 1 configuration (CORE)	Potential configuration	DCP No. 5 RFP baseline (TAC (configuration)
Air Vehicle (707 or DC-8): Time on station (at 1,000 NM from base)	7 hours 29,000 feet	7 hours 29,000 feet	7 hours. 30,000 feet.
Surveillance: Radar—Range (F-4/B-52). Position accuracy (within 30 minutes of aircraft position updating). IFF—Range. EIFF—Range. Passive emitter locator. Annex B (COMINT). Data processing/software:	[Deleted.]		
Target reports. Track capacity. Number of intercepts. Manual Digital data link.	[Deleted.]		
Crew/display consoles: Crew size Multipurpose consoles Command display	9	16	17.
Survivability: Self-defense subsystem I.R. & R.F. warning Chaff and flares Jammers	[Deleted.]		
Communications (channels): COMSAT terminal. Survivable (VLF). AM/SSB/CW commercial receiver. Voice: Secure. Nonsecure Data. Teletype Relay. ECCM system.			

Note: Provisions (space, electrical power, cooling) are included in the core configuration for all items in the potential configuration including communications satellite terminal and ECCM. These latter 2 subsystems would also require some aircraft modifications and hence are identified as growth items.

Question. Will this reduced control capability still be able to cope with the threat that is anticipated for the late 1970s and the 1980s in the ADC role! In the TAO role!

Answer. Yes. As explained in the previous answer, the Air Force believes that the core configuration is adequate for both the ADC and TAC role based on the current NIPP estimate of the threat. AWACS will also have the growth potential to increase its capabilities in its ADC role and its TAC role to meet an expanded threat, should one develop.

Question. Does the AWACS as presently proposed have growth potential? Can its capability be increased on a modular basis by retrofitting equipment and using the same airframes?

Answer. The configuration, referred to as the Potential configuration, is an indication of the growth capability of the "core" configuration and represents the increased capability that could be achieved by the addition of additional identical equipments. The Air Force believes that the core configuration is adequate for both the ADC and TAC role based on the current NIPP estimate of the threat. AWAOS will also have the growth potential to increase its capabilities in its ADC role and its TAC role to meet an expanded threat, should one develop.

Question. Is the same configuration now proposed for the TAC version of AWACS as for the bomber defense version? Will these aircraft be interchangeable in the different roles?

Answer. In the core configuration, the physical configurations will be basically the same. There will be some difference in the computer programs. Either version can be readily changed from one role to the other by changes to the computer programs.

Question. Under present schedule, when would we expect to have AWACS in sufficient numbers to constitute an effective operational system?

Answer. An IOC of five AWACS is forecast at [deleted] months after contract with an increase of [deleted] per month thereafter until a total of [deleted] are operational.

Question. R&D work on a look-down, shoot-down capable interceptor to team with the AWACS has been suspended. Please describe the interceptor force that is proposed to give this control and warning system its kill capability in the bomber defense role.

Answer. It is true that work on an advanced interceptor has stopped, but planning for an advanced interceptor has not. We have ceased considering the F-106 (X) in view of continued lack of Congressional support and are now in the process of selecting a new interceptor candidate. The extremely high cost of developing and building high performance airplanes prevents us from attempting to acquire an airplane uniquely designed for air defense (such as the F-12). However, the supersonic range required of an interceptor to be an adequate hedge against Soviet production of their new bomber requires performance better than current tactical airplanes possess. We are now examining the possibility of adapting one of the new air superiority fighters (F-14 or F-15) to the CONUS air defense mission and will make a firm recommendation to Congress this year. However, meanwhile AWACS will increase considerably the effectiveness of existing interceptors.

Question. Assuming that the F-106 will play an important role in this regard, how effectively can this interceptor with its current fire control system be used with AWACS on its orbit? What steps are planned to reduce the vulnerability of the AWACS to enemy attack?

Answer. Until an adaptation of one of these aircraft can be developed and produced, we will have to depend on deployment and tactics to minimize the shortcomings of the F-106 (its lack of a look-down/shoot-down capability and short supersonic range). The F-106 has adequate combat range at high altitude to cope with current Soviet bombers if it can be directed by an effective and survivable command and control system. AWACS will allow us to establish positive track on enemy bombers at much greater range than can be done with current surface based air defense radars. This will allow more time in which to dispatch the F-106, thus allowing it to cruise out subsonically. In this way, the F-106 will be able to engage bombers at about [deleted] miles, beyond the [deleted] mile range of current Soviet air-to-surface missiles. Since AWACS will be able to determine the altitude of the bombers, it will be able to direct the F-106 to drop to low altitude, if need be, where its fire control/missile system will not be as effective as it would be with an improved interceptor, it will be far superior to our existing system. The data link of current F-106's will be compatible with AWACS. And, of course, AWACS will be survivable in the face of ballistic missile attack where our existing SAFE/BUIC command and control system will not be.

Air Force studies have shown that the survivability of AWACS is best assured by [deleted].

Question. If the AWACS is to function as a part of a modernized air defense system to include a CONUS Over-The-Horizon radar system and an undetermined improved manned interceptor and is intended to operate in the 1975–1985 time period, to what extent will the present planned capability of AWACS alone provide an air defense system?

Answer. AWACS alone can provide a considerable improvement over the present system. Without the CONUS Over-The-Horizon radar system, the air defense tactics call for [deleted].

One of the most misunderstood aspects of the core configuration AWACS is its surveillance capability. The radar capability has not been decreased in the core configuration, hence the air defense early warning capability of the AWACS has not been diminished. The same is true for the AWACS capability to identify, track and control intercepts; all of these functions are being retained at the same high level.

Each of the elements of the modernized air defense system (OTH/AWACS/Interceptor) provides capabilities not possessed by the present system. The individual system elements complement one another, but each can be justified on the basis of its individual contribution to improved bomber defense. In combination, we realize a synergistic effect in total effectiveness which provides the justification for modernization.

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Question. Please furnish a detailed statement of how and for what the \$87 million in R & D funds will be expended if the request is approved by the Conaress.

Answer. We are going to use the \$87 million as follows:	lions
Complete the Westinghouse high PRF doppler radar in both static ground test and brassboard configuration	\$24.0
Complete the Hughes medium PRF doppler radar in both static ground	24.0
Complete prototype AWACS aircraft for Westinghouse high PRF radar including basic airframe changes, radome and rotary joint, air condi-	40.0
tioning mods and test instrumentationComplete prototype AWACS aircraft for Hughes medium PRF radar including basic airframe changes, radome and rotary joint, air condition-	13.0
ing mods, and test instrumentation	13.0
Software development	2.0
Engineering costs for common items on commercial aircraft mods System engineering for a limited system demonstration of high density	5.4
tracking in clutter and ECM, and of actual control of intercepts	2.0
MITRE support	2.6
Wind tunnel work at AEDC	1.0
Total	87.0
Question. What is the presently estimated total cost of the AWACS reseand development and acquisition program, including all elements of cowhat is the estimated program cost of each AWACS under the revised program. The following is a break-down of the AWACS estimated costs the core configuration and a buy of [deleted] aircraft:	osts? ram? for
 -	illion
R.D.T. & EProduction:	–
Mission system (flyaway) 1	, 063
Support	120
Initial spares and repair parts	200
Total program cost2	, 064

Production unit cost: [deleted] million for [deleted] aircraft Program unit cost: [deleted] million for [deleted] aircraft

Question. Will AWACS be on-station continuously or only on a random basis?

Answer. During periods of imminent attack, or in critical areas, AWACS will be on station continuously: otherwise, manning will be on a random basis.

Question. For FY 1970 the Congress authorized and appropriated \$2.5 million for a study of the CONUS Air Defense Interceptor question. This money was deferred and not expended. In view of this, and in view of the fact that it appears probable that the interceptor choice will be between the F-15 and the F-14, what is the justification for requesting an additional \$2.5 million in R&D funds for FY 1971?

Answer. We are planning to expend the deferred FY 1970 and requested FY 1971 funds for starting engineering of the aircraft and armament system modifications needed to adapt either of these aircraft to the CONUS air defense mission. Since we expect to make this selection this year, elimination of the FY 1971 funds will create delay in getting this work underway.

SOVIET AIRPLANE DEVELOPMENT

Chairman STENNIS. Senator Thurmond.

Senator Thurmond. General Glasser, what procedures do the Russians follow in aircraft design and development? I understand their methods have been successful in producing a large number of superior tactical aircraft.

General Glasser. I don't have direct personal knowledge of the Russian procedure, but I can relate what is popularly accepted as being their approach. They have a number of design teams that are held together throughout the years. They undertake the design of an aircraft. It is generally put into prototype production and tested, and every so often one of those that shows up as being superior is pulled off and put into full-scale production.

Senator THURMOND. General Glasser, in your opinion is the Russian

Air Force superior to ours in the tactical aircraft area?

General Glasser. That is too general a comparison to answer "yes" or "no." They are certainly superior numerically. So far as qualitatively we would have to look at individual aircraft. Some of the aircraft that they have are superior in certain of the flight regimes. They are inferior in others, and that is what makes it very difficult to design aircraft and tactics to counter those.

Senator Thurmond. Under present schedules do you feel this tacti-

cal air power balance will continue or change?

General GLASSER. It certainly will change. The key questions are in which direction it will change and to what degree. That is a matter that is going to be heavily dependent not only on what Russians do but also the degree of success we achieve in our proposals for force modernization.

MODERN AIR FORCE

Senator Thurmond. Is our tactical air force modern enough now to take us into the mid-1980's excepting, of course, the F-15?

General Glasser. I think not, sir.

Senator Thurmond. Then what will fill the gap?

General GLASSER. Well, there are a number of things that are required. In addition to the F-15 which you have mentioned, we would certainly need the AX aircraft that we have been speaking about earlier in the hearing. We also have a variety of weapons and avionics systems that are needed to improve both the current aircraft, the F-4Fs, and the A7s, as well as on-going improvements that will be useful for the F-15s in the time period that you describe.

Senator Thurmond. I believe the Air Force has pointed out that compared with other planes, the F-111 accident rating is low. I keep reading about the F-111 accidents in the papers, and I am wondering

if this is really true.

General GLASSER. It is statistically true that for the number of flying hours and the number of flights in which this aircraft has been employed, that it is below many of the other aircraft that have successfully entered the Air Force inventory.

F-111 CAPABILITY

Senator Thurmond. Could this be attributed to the fact that the F-111 has been flying around in circles a lot and not flying at maximum ability?

General Glasser. I don't think so. I don't think that is the case. It has been used to a significant degree by the Tactical Air Command and in the test programs, and has not been flown in circles, so to speak.

Senator Thurmond. How can the Air Force determine if it is safe to buy more of the F-111s until some tests are made to thoroughly check its effectiveness at maximum capacity?

General GLASSER. It would not be the Air Force's policy to buy more F-111s prior to gaining the assurance that indeed they are a satisfactory aircraft. But I believe the test program that General Ferguson and General Esposito have been relating here is designed to give us the confidence to go ahead with the additional aircraft that are required to fill out the proposed wings.

Senator Thurmond. I believe it is conceded that we do need a plane like the F-111, and I am just wondering when you feel that we will get such a plane that can meet the maximum specifications that the

F-111 was designed to meet.

General Glasser. There is no other aircraft of which I am aware that would meet the capability requirements for which the F-111 was laid down. We simply have to make the F-111 work or do with something of lesser capability.

Senator Thurmond. Could the Air Force have done more to make thorough checks before accepting the F-111s that we have already

bought?

General Glasser. Retrospectively the answer would have to be yes, but I believe that at the time and under the circumstances, everything was done that reasonable prudence would require be done. Perhaps

you would like to amplify that, General Ferguson.

General Ferguson. I would just say that we followed practices that had been quite successful in developing and testing other aircraft, and only when we ran into structural difficulties which were a result of a new design did we recognize that perhaps more rigorous testing of components would have been appropriate. This is a retrospective view, of course.

B-52 LIFE EXTENDED

Senator Thurmond. General Glasser, I have one question here on the SRAM. You indicate the SRAM missile will extend the usefulness of the B-52. Can you explain how and for how long the useful life will be extended?

General Glasser. By extending the useful life of the B-52 through the use of SRAM, we are not referring to the structural life of the aircraft at all. We are referring to the fact that with the increasingly difficult defenses that we anticipate the B-52 will face, the SRAM makes it possible for him to deliver his ordnance in spite of those defenses. Hence it will extend its operational life as distinct from the structural life of the aircraft.

Senator Thurmond. For what period of time do you estimate it will extend the useful life of the B-52?

General GLASSER. I am hard pressed to put a number on that, because it is a pure function of the rate at which the Russian defenses are built up. Let me say at the moment that I would anticipate that it is in the vicinity of 5 years, but I would like to examine that with people not present in the hearing room today and correct this in the record if I may

(The information follows:)

With SRAM we believe the B-52 can penetrate Soviet terminal defenses through the life system of the aircraft, based on what we know of Soviet defensive capabilities at present. The SRAM enables the B-52 to hit targets inside defenses or hit the defenses themselves without exposing the B-52 to engagement by terminal defenses (Surface to Air Missiles—SAM—primarily).

There can be no precise definition of the useful life of the B-52 without SRAM. This is a very dynamic area which depends considerably on the defensive threat and changes thereto. In addition, the terminal threat (SAMs, AAA, etc.) is not the only factor bearing on the problem; however, in this area the Soviets are known to be improving both the capability and quantity of their Surface to Air Missiles. As an example, SAMs (SA-3 particularly) presently defend many key targets. Our ability to penetrate them without SRAM must rely on Electronic Countermeasures (ECM) combined with low altitude tactics. Under these conditions our losses would be severe; in fact, the B-52 capability to penetrate terminally defended target areas declines rapidly over the next few years without SRAM.

The dynamics of the problem are illustrated by the fact that we are trying to improve the B-52 in many areas. This makes it difficult to highlight one area and its specific contribution. SRAM is one of several offensive and defensive weapon systems designed to counter the defensive threat and enable the B-52 to accomplish its mission.

SRAM EFFECT ON B-52

Senator Thurmond. Thank you. When do you feel the useful life of the B-52 will come to an end without SRAM?

General Glasser. That again is a question which has a wide variety of opinions in the answer. There are many informed people who would say it is already at the end. I personally don't associate myself with that answer.

I think the likelihood of what the air defenses of Russia are apt to be is such that the useful life of the B-52 is a few years away. I hope that is the case.

Senator Thurmond. I have a few questions here of General Ferguson. General Ferguson, you are asking for I believe \$46 million in R. & D. funds for SRAM, and also \$99.5 million which you state is to increase production tooling to buy some missiles. It would appear that a substantial amount of R. & D. work is still required in SRAM so how can you justify entering procurement so soon.

General Ferguson. We have had a considerable amount of testing and investment in R. & D. up to this point, Senator Thurmond. The R. & D. is not an inordinate amount to finish up the program as compared with others, and the production money that we are asking for in this year is for starting on long lead time items. No decision will be made on production until we are satisfied with the results of the flight tests, so that we have that safety built into our decision.

Senator Thurmond. Why do you feel the SRAM costs for R. & D.

have been so high?

General Ferguson. Several reasons, and I think probably they relate to two areas. No. 1, the underestimate of the complexity of designing and proving out the rocket motor associated with it. The other is that this is a missile that is heavily dependent on the navigational system of the aircraft to which it is attached. After we started SRAM there were a number of changes that were incorporated in the FB-111 that resulted in a number of changes that had to go back into the SRAM. These are the principal reasons plus some inflationary factors that resulted in the higher R. & D. costs.

Senator Thurmond. Isn't this, the SRAM procurement, the type

of occurrence that you stated the Air Force wants to avoid?

General Ferguson. Yes, sir, it is in the future, that is a total package concept consummated 4 years ago, and one that we feel that in retrospect is one that should have been approached more along the lines of the F-15 contract that we have just recently signed.

COST GROWTHS IN RELATION TO BUDGET CONSTRAINTS

Senator Thurmond. General Ferguson, you state that substantial cost growths on the A-7D program is in part due to program stretchouts because of budgeting constraints. Is it my understanding that Congress had authorized about \$300 million in funds for this program that have been reprogramed out of the A-7D system into other programs? If this is true, how can you relate cost growth to the budgetary constraints?

General Ferguson. This is an action that was taken at air staff level, and if I may, Senator Thurmond, I would like to ask General Glasser to answer that question, except to make a general comment that any time you stretch out a program the unit cost at a lower production rate

goes up.

General Glasser. I can answer it General and I will ask some of my associates to amplify. What is referred to here is general overall budget constraints which caused the Air Force to make reductions in certain programs to stay within the total funds available to the Air Force. This resulted in our procuring A-7s at a rate less than that which might have been desirable to complete the buyout. I believe this is what General Ferguson was referring to when he said this caused an escalation in his costs. General Pitts, do you have anything to add to that?

General Pitts. When you stretch a program you are going to incur increased costs due to stretchout, reprograming, and the fact that we don't buy the number of aircraft in those years that we expected to because of the stretchout. The lower buy of aircraft, which carry the

same overhead, results in increased unit cost.

MISSILE LEVEL

Senator Thurmond. General Ferguson, at a time when the Soviets are continuing to implace land-based ICBM's at a rapid rate, to the extent that they have or will surpass the United States in numbers, and I believe they have surpassed us now, according to the report by Mr. Laird, and when the Chinese threat appears on the horizon, how do we justify the decision to keep our missile forces at the same level for the next 5 years?

General Ferguson. Senator Thurmond, that is a policy decision which is far above my level. I am developing and procuring missiles in the numbers and with the characteristics that I am directed to do.

It may be that General Glasser would like to respond.

General Glasser. I am in a position of having to say the same thing as General Ferguson, that it is also above our level. It is a national decision that has been taken to hold the strategic land-based force at a fixed level; namely, at 1,000 MINUTEMAN.

Senator Thurmond. I presume you would feel better though if we

did go ahead and increase our strength in this field.

General GLASSER. We are increasing our capability within this 1,000 missile force. As you know the MINUTEMAN III is a much more capable missile than its predecessors that are being replaced, but to answer your question specifically, I individually would be quite happy to see an increase in the overall force, at least so that we could stay on an even match with the antagonist.

Senator Thurmond. General Ferguson, it is conceded that the Soviets have caught up with us in numbers of strategic missiles, but it is contended that they are still behind in advance missile technology such as accuracy, MIRV's and penetration aids. The validity of these assumptions appears doubtful in some respects.

In view of the rapid Soviet strides, what assurance do we have that we will continue in the future to have a substantial qualitative lead, to extend superiority in the number of deliverable weapons and an overall advantage in the combat effectiveness of our strategic nu-

clear forces.

General Ferguson. I can't see a continued advantage in technology based on the intelligence we have on their flight test of missiles. They may at the moment be slightly less capable in accuracy, but having examined some of their flight tests and experiments as we can from a distance, there is no reason to believe that their accuracy won't equal ours soon if it doesn't now.

Senator Thurmond. General Ferguson, let me refer to the possibility that the Soviets may deploy MIRV, may achieve greater ICBM accuracy, may extend and improve their ABM forces, and may continue to deploy ICBM's and SLBM's. If these things should occur,

how would it affect the balance of power?

General Ferguson. Once again I am afraid I am not the appropriate witness to answer that question. Clearly their capability to launch ICBM's, their total yield of their warheads and their capability in defense reportedly is considerably greater than ours at this time.

Senator Thurmond. Is there any likelihood that the Soviets might achieve a real first strike capability if they achieve these advances

and we did not react appropriately?

General Ferguson. Obviously that is an option that is open to them, I am sure. I am responding to your question about the first strike

capability.

Senator Thurmond. I was asking is there any likelihood that the Soviets might achieve a real first strike capability if they achieved all those advances I mentioned if we didn't react.

General Ferguson. The answer is "Yes."

Senator Thurmond. So that we would have to maintain superiority, wouldn't we?

General Ferguson. The answer to the question is "Yes," Senator.

BALANCE OF POWER

Senator Thurmond. What kind of action would be required of us to assure the maintenance of the balance of power if the Soviets proceed down this path?

General Ferguson. Here again, I am in a position of developing those systems which are directed, and you are asking questions that

are of a major national policy nature.

Senator Thurmond. Are you familiar with any other developments by the Soviets which are reasonably possible which would have an unsettling effect on the balance of power, or would you consider that out of your scope?

General Ferguson. Well, we follow very closely their scientific experiments and the tests of their various ballistic missile and space

vehicles, both offense and defense, as best we can, and clearly they are

doing more than we are in this area.

Now by virtue of the geography and the fact that we can't examine as closely as we would like what they are doing, we always must be braced for a surprise, and those surprises do show up periodically.

Senator Thurmond. The Navy F-14 program has some nine R. & D. aircraft. The Air Force F-15 program as of last September required 12 R. & D. aircraft. This quantity has now been increased to 20 R. & D. aircraft. What is the basis for the increase and how does this compare to the quantity of Navy aircraft?

General Glasser. Part of this is a semantic difficulty, Senator Thurmond. The Air Force had always carried a portion of its test aircraft in the procurement account because indeed those aircraft would be used briefly for the test program and then delivered to the inventory.

The House Appropriations Committee felt that these aircraft should more properly be funded from the 3600 R.D.T. & E. funds, and that accounts for the increases that you described.

F-15 PROCUREMENT APPROVAL

Senator Thurmond. I believe the Air Force plans are to procure some [deleted] F-15 aircraft. How many of these aircraft has OSD

approved for procurement?

General Ferguson. None has been approved for procurement, Senator Thurmond. We are operating on a basis in which we accomplish certain milestones in the development and proof and flight test aircraft before there is a commitment to procurement of any aircraft, for the inventory.

Senator Thurmond. This is the last question. The Air Force awarded a combination of cost plus incentive fee and fixed price incentive contract for the F-15, with options to purchase the first 107

aircraft at not to exceed ceiling prices.

What is the difference in this contract as compared to the total package type contract that has caused the Air Force problems.

General Ferguson. May I ask General Bellis, who is the program di-

rector, to respond to this question, Senator Thurmond?

Senator Thurmond. Yes.

General Bellis. Yes, sir. There are a number of very significant differences. First of all, we have tried to be conservative to give us program stability. We do not have production for inventory until we have completed our testing and we, therefore, reduce retrofit liability. There are a very few number of aircraft involved prior to our finding the problems that may be inherent. This of course delays its operational availability.

Secondly, we do split the development and the production portions of the program, such that, as General Ferguson pointed out, we will not pick up these production options until actual flight test demonstration. We are not even going to ask for production release until over 5 months after first flight, and we will have a significant amount of actual flight test before we ever obligate Government funds for production aircraft. There are a number of other very significant points, such as total system performance responsibility, although we have the Government furnished engine, there is a relationship of a

formal contract relationship between McDonnell Douglas, and Pratt & Whitney to certify that the engine won't just demonstrate on the ground, then be delivered to the system contractor. It actually has to work in the air to the requirement of the total system.

There are limitations of our liability that are significant in this

contract, and a number of other sophistications.

Senator Thurmond. Thank you. General Ferguson and General Bellis, and General Glasser, I wish to thank you.

FISCAL YEAR 1971 FUNDS FOR F-111

Chairman Stennis. Senator Cannon.

Senator Cannon. When I left off my questioning before General Esposito mentioned the costs of the modifications on F-111 was \$31 million, about \$70,000 per aircraft. Recognizing that cost will reduce your fiscal year 1971 funds, do you believe that you will be able to buy those 40 F-111s out of your 1971 funds?

General Ferguson. The general plan is to reduce the buy to accom-

modate those increased costs.

Senator Cannon. How much does this mean you will have to reduce the buy?

General Esposito. Our estimate right now is four aircraft.

Senator Cannon. Is how much?

General Esposito. Four aircraft. It would reduce by four F-111Fs to account for it.

Senator Cannon. So you would reduce to 36 aircraft with the \$483.5

million, is that it?

General Esposito. That is correct, sir. That hasn't been firmed up. We are waiting to get more firm data before we come up with the exact number.

Senator Cannon. Will this still give you the four wings? I recognize now that you have already reduced now to get to a real tight position on the four wings. What is this going to do, these added four aircraft? General Low. The four airplanes, Senator Cannon, of course, would

General Low. The four airplanes, Senator Cannon, of course, would come out of categories other than unit equipment, so we are buying say more than the unit equipment, so this would not reduce you enough to make any difference in the four wing structure.

Now somewhere in the out years you know as attrition was getting to you, you might find yourself dipping more and more into command

support.

SPARROW MISSILE

Senator Cannon. General, the Air Force was funding SPARROW G missile development with F-111 funds. I would like to ask you if you think that is proper first, and then ask you why you are requesting \$800,000 for a SPARROW G missile in the F-111 aircraft program for fiscal year 1971, when this appears to be a cancelled program.

General Ferguson. May I ask General Glasser to respond to that if

he has the data. I don't have that in front of me.

General GLASSER. The only money that we have had in the SPAR-ROW G that I am aware of to date has been R. & D. money, in augmentation of the Navy's R. & D. and related to the F-111D. To date, development has continued; however, the procurement program has been deferred.

Senator Cannon. As I understand it, there is \$800,000 for SPAR-ROW G missiles in the 1971 program. Now I may be in error on that.

General Pirrs. That is being researched in the staff right now, Senator Cannon, and there is a proposed answer on its way back over for the record of your subcommittee.

(The information follows:)

The rationale behind funding this missile under the F-111 R&D program is based on the fact that the task to be funded was essentially that of making the F-111D aircraft capable of carrying the Navy-developed Sparrow AIM-7F missile. (The F-111D avionics system utilizes radar frequencies which are incompatible with the AIM-7F. The AIM-7G missile is the AIM-7F with a new, F-111D-compatible radar seeker.) No new missile was developed. An existing missile was changed to permit carriage and use on the F-111D aircraft. The major R&D costs and tasks were related to aircraft needs, i.e., the missile control set contained in the aircraft. Since the contractor (Raytheon) was responsible for the combined missile/aircraft interface effort, and since the problem was essentially to place a 90% in-being missile on an aircraft still in development, it was logical to fund the entire interface effort under the aircraft line

There was an item in the FY 71 F-111 R&D program element for \$500,000 for the AIM-7G missile. This was in support of the development program described above to fund for completion of the Category II test phase. There was a staff estimate that an additional \$300,000 for a total of \$800,000 would be required, however, it was not in the budget. Regarding the procurement program there are no FY 71 monies in the F-111 program element for production of the AIM-7G. All previous procurement fund requests were deferred pending the outcome of the development effort.

As a result of a recent review by the Air Force of the AIM-7G R&D program, this effort was cancelled and a stop work notice issued on 19 March 1970. This decision was based on the reduced number of F-111D aircraft, the high procurement cost, potential follow-on cost savings, and severe budgetary restrictions. Funds are, therefore, no longer required for the AIM-7G. The funds will be required, however, for other \vec{F} -111 development work such as the Titanium wing

carry-through box and should not be deleted.

CURRENT YEAR PLANE BUY

Senator Cannon. How many F-111As, Es, and F aircraft will the Air Force purchase, including the new 36 in this year's bill?

General Glasser. General Esposito, would you like to list the

numbers?

General Esposito. We will buy 18 test aircraft, 141 F-111As, 94 F-111Es, 96 F-111Ds, and right now our planning is for 98F-111Fs, which would be reduced by the number to make up for the cost of this recovery program, something up around four, so that would be the tactical force, and then we are buying 76 FB-111s and 24F-111Cs.

Senator Cannon. Of the B's it was 76?

General Esposito. Yes, sir.

Senator Cannon. And the Cs 24?

General Esposito, 24.

Senator Cannon. That 24 is the Australian buy? General Esposito. The Australian buy.

Senator Cannon. Will this number be sufficient for the Air Force to maintain four wings of F-111 aircraft and still allow adequate numbers for attrition, maintenance, and training?

General Low. Yes, sir.

Senator Cannon. What happens to the P-100 engine program that was to go into the F-111F when the 121 aircraft were dropped by OSD late last year?

General Ferguson. It still goes in the airplane.

Senator Cannon. That goes in?

General Ferguson. Yes, sir.

Senator Cannon. What does that do to your cost? You had \$75 million R. & D. in the P-100, and an estimated \$800,000 in engine. Does

that cost go up now?

General Esposito. No. sir, the cost of the P-100 engine is approximately the same as the P-9 which is the preceding generation of engines that goes in the F-111D. They ran around \$800,000 per engine in production. In fact all models of the engine are very similar, between \$710,000 and \$800,000, depending on the P-3, the P-7, the P-9, and the P-100.

Senator Cannon. And your \$75 million R. & D. is already an invested cost, is that correct?

General Esposito. Yes, sir.

PREPARED QUESTIONS FROM SENATOR SYMINGTON

Senator Cannon. Does the staff have any other questions?

Mr. GILLEAS. Senator Symington had some, sir. The answer is yes.

Senator Cannon. General, there are some added questions that will be submitted for the record and you can supply the answers to those for the record.

(Questions submitted by Senator Symington, Answers supplied by the Department of the Air Force.)

Question. Does the C-5 have terrain following radar and, if so, why is it an Air Force requirement?

Answer. Yes, the C-5A does have a terrain following radar. The reason for this radar requirement is survival in a hostile environment, i.e., to enable low altitude flight to avoid detection by enemy surveillance radar during aerial delivery missions or operation into support area airfields. The C-5A is so large and relatively slow (compared to small tactical aircraft) that it cannot be protected by conventional counter-measures (decoys, chaff, etc.).

Question. What is the need for continuous ground mapping from directly under the aircraft out to maximum "Line of Sight" range?

Answer. The need for continuous ground mapping from directly under the aircraft out to maximum "line of sight" range is to obtain precise enroute fixes for highly accurate approaches to the terminal areas in which aerial deliveries must be made, and once there, to navigate to that point (Computed Air Release Point—CARP) at which cargo must be released in order to land within an acceptable distance from intended ground impact point under adverse weather conditions. This capability is also required for navigation to and final approach to uninstrumented (no ground aids such as Instrument Landing System—ILS or Ground Controlled Approach—GCA) support area airfields in adverse weather.

Question. General, you state the cost of the AWACS is 2.1 billion for [deleted] aircraft or about [deleted] million per aircraft. Can the AWACS be justified if the Air Force does not purchase an advanced interceptor whose mission is to kill the targets detected by the AWACS?

Answer. The AWACS is the key element of the bomber defense modernization program. Without the AWAC force we will not have a truly survivable wartime command and control system, and we will not have the required low level coverage nor the capability to extend the bombers engagement area well beyond our borders. This is an urgent requirement no matter whether the current interceptors are retained in the system or improved or advanced interceptors are included in the force structure.

The Air Defense AWACS is one element of a defensive system designed to counter the threat of low flying Soviet or Nth country bombers carrying gravity bombs and/or air-to-ground missiles. The present air defense does not have adequate radar coverage, either at low level or long range to conduct intercepts against low flying or standoff missile carrying bombers. The AWACS will extend the radar coverage out to approximately [deleted] miles, will provide coverage against low flying targets and will be capable of directing the present interceptors into a combat position against this threat at distances of [deleted] nm from the U.S. borders. Although the present interceptor will be substantially less effective against low flying targets than the modernized interceptor, AWACS will permit vectoring interceptors into a position where their radar and/or infrared search-track system can acquire attacking bombers, and allow the interceptor to complete the attack.

Question. Could the AWACS be justifled costwise for the tactical role only?

Answer. We believe we can justify AWACS for tactical operation.

Analysis indicates three benefits will result from improved surveillance and control of offensive aircraft: reduction in offensive aircraft attrition, increased kills of enemy aircraft, and a reduction in the number of offensive missions aborted due to jettisoning of ordnance. The accumulative effect would be to increase the effectiveness of air operations, permitting either increased impact on the enemy with the same force or a reduction in intensity of operations without diminishing the impact.

Question. General, why is it necessary to have \$2 R&D flights for the MINUTE-MAN III, recognizing that the POSEIDON R&D flights only numbered 20-26, depending on successful test objectives?

Answer. The MINUTEMAN III basic R&D test program originally called for 28 flights. This has been reduced to 25 flights and the 3 extra missiles will be used for ground testing. It is the Air Force's judgment that the current program is both necessary and sufficient prior to the MINUTEMAN III operational configuration which will have its IOC in [deleted].

Question. Do you feel the concurrency of going operational in July of this year when many R&D test flights remain to be flown is a wise course of action, recognizing that many modifications may still emanate from your test program?

Answer. Yes, the Air Force does feel that this is a prudent course of action for two reasons.

First, the 25 flight basic R&D program properly tests the configuration of MINUTEMAN III which will have an IOC in [deleted] and this program is not considered to be a high risk one.

Secondly, the 8 R&D flights to be flown after IOC will be to a limited extent confirmational in nature but primarily they will be done to test systems and subsystem which will, or may, be used in configurations which will not be operational for several years. Examples of the systems are a new airborne Computer, a second source Guidance and Control unit, a second source Third Stage, and a different ground system.

Question. When will you commence flying MINUTEMAN from operational silos and how much will this program cost?

Answer. At the present time we are anticipating direction from the Secretary of Defense to proceed on our plan to launch MINUTEMAN from operational silos. The schedule that we are recommending calls for a launch of a MINUTEMAN II from an operational silo approximately 19 months after go ahead. This lead time is required so that we may develop a new range safety system that will provide us with a test missile configuration as close as possible to the operational configuration and that will provide us with the safety necessary for overflight of the United States. This schedule also reflects a plan for a launch of a MINUTEMAN III from an operational silo one year after the first MINUTEMAN II launch. The total cost of the MINUTEMAN III portion of this program is estimated to be [deleted] million. This figure presupposes, however, that the MINUTEMAN II program is completed which includes development that is common to both systems. The cost of the MINUTEMAN II program is approximately [deleted] million.

Question. You state the "missile range" of the SRAM's fired so far exceeded predicted values for the test. What were the missile ranges and what is your performance specifications in this great

Answer. Individual flight test launches are not conducted for the sole purpose of verifying the missile capability to achieve a single performance specification. Rather, they provide a means of evaluating the performance of the entire weapon system throughout a particular envelope. In the successful launches to date attainment of maximum range has not been the objective, hence relation to a range performance specification is not appropriate. Ranges achieved on the 2nd, 4th and 5th launches were [deleted] respectively, as compared to predicted

values of [deleted]. These ranges are measured from point of first ignition to fuzing point. A more important aspect is the velocity with which the weapon achieved this range. In each of the above cases actual missile arrival times at the point of fuzing were less than predicted. Evaluation of test results indicates that motor performance, drag, and ablation characteristics have favorably influenced the achieved velocities. This gives confidence and credence to the ultimate attainment of system performance objectives, including maximum range. The objective requirement for maximum low level range is [deleted] for the semiballistic trajectory, when launched from the aircraft at Mach [deleted].

Question. You are requesting [dcleted] missiles in FY 1971, and yet the R&D effort will continue through FY 1971. Is this not the type of concurrency which has caused us difficulty in the past?

Answer. The proposed production program, starting with a FY 1970 initiation of long lead time procurement, tooling and production planning to support a FY 1971 production buy of an initial increment of [deleted] SRAM missiles. does indeed reflect a concurrency with the remaining portion of the R&D effort. Viewing the total R&D program, however, which is now over three years in being, it is clear that the essential development effort has been completed and a firm engineering baseline established. The recorded performance of missile launches in the flight test program to date gives confidence in the validity of that baseline. The forecast status of the flight test program in the August 1970 time period when final decision to commit to the FY 1971 production would be anticipated will have the B-52/SRAM Category I test program completed and the Category II flight test effort well underway by that time. The FB-111/SRAM Category I test program is expected to be at its mid-point in September. It is also germane to note that the initial order lead time on missile delivery is 20 months; hence the concurrent aspects of the remaining R&D effort vis-a-vis actual production are minimal. In any case, our advocacy of the production decision will be based on satisfaction with the results and numbers of flight tests—reflecting accomplishment of a wide spectrum of mission types and attainment of a valid base for assessing ultimate SRAM weapon system accuracy, reliability and maintainability.

Question. Why would it not be wiser to finish R&D before buying SRAM production missiles?

Answer. A decision to complete the total R&D program before undertaking a SRAM production commitment would unquestionably have the merit of a completely safe, risk-free option, although in a limited sense. Evaluation of the wisdom of such a choice should go beyond the factors concerning the nature of the alternative of concurrency and treat also the subject of the urgency of the requirement for the weapon system. The need for SRAM—to provide our Strategic Forces with the capability to defeat terminal bomber defenses—is based on intelligence estimates that the Soviet Union will place primary emphasis on [deleted]. The proposed SRAM production schedule would provide the first fully equipped B-52/SRAM squadron in [deleted] and the first FB-111/SRAM squadron in [deleted]. An extended postponement of SRAM production would require acceptance of the impact on our Strategic Force posture—a concern I would emphasize strongly—plus the concomitant effects of a significantly greater cost due to the discontinuity of contractor and subcontractor effort. In his total context, I could not advocate such delay.

COMMITTEE RECESS

Senator Cannon. Thank you very much. The hearings will now stand in recess until 2:30.

(Whereupon, at 12:25 p.m., the committee was recessed, to reconvene at 2:30 p.m., of the same day.)

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(Afternoon session, 2:35 o'clock, Wednesday, March 11)

Present: Senators Stennis (chairman), and Goldwater.

Of the staff of the Committee on Armed Services: T. Edward Braswell, Jr., chief of staff; and Labre R. Garcia, professional staff member.

Of the staff of the Preparedness Investigating Subcommittee: Ben J. Gilleas, director of investigations; Ed Kenney, Don L. Lynch, David A. Littleton, and George Foster, professional staff members.

DEPARTMENT OF THE AIR FORCE

PROCUREMENT

STATEMENTS OF GEN. JAMES FERGUSON, COMMANDER, AIR FORCE SYSTEMS COMMAND, AND LT. GEN. OTTO J. GLASSER, DEPUTY CHIEF OF STAFF. RESEARCH AND DEVELOPMENT—Resumed

F-111 ADDITIONAL FUNDS

Chairman Stennis. Gentlemen, I know you have already had some discussion of the F-111. I regret that I couldn't be here all the morning to hear you, but I will be fully briefed.

Looking beyond this fiscal 1971 budget, will you be asking for

any further funding for the F-111?

If so, how much, assuming of course that you get it straightened out. General Ferguson. There is a fiscal year 1972 request, Mr. Chairman, for \$115.4 million.

Chairman Stennis. That would be for how many?

General Ferguson. That is not associated with the numbers of airplanes. As I recall, that rounds out—can I ask General Esposito to fill out that question, please?

General Esposito. That \$115 million is to pay overtarget costs that

have accrued in prior years.

Chairman Stennis. That is just to round out the bill; to pay up?

General Esposito. That is correct, sir.

Chairman STENNIS. So there are no new planes then beyond the 1971 budget ?

General Esposito. No, sir; there are not.

Chairman Stennis. How many will you have, assuming you get the 1971 request?

General Ferguson, 547.

C-5A CONTRACT MANAGEMENT

Chairman Stennis. All that information will be helpful to us here in writing up the bill as well as when we explain it on the floor. Let

me put it this way, gentlemen. The new system that you have now, if you were letting a contract of that kind, how would it work under your new system? I don't mean the type of contract. I think you would not adopt that kind of contract. I assume that. But under your new system that you described this morning, explain how it would work and give the facts that contrast your new system with the system they were using for the C-5A.

General Ferguson. All right, sir.

Chairman STENNIS. Not just the type of contract now. I am talking about your system.

General Ferguson. The management of the system.

Chairman Stennis. I think it would be very helpful to have some words from you in the record on that.

General Ferguson. All right, sir; just a word or two about the way

the C-5 contract was started.

Chairman Stennis. Yes, go into any background you wish please. General Ferguson. Yes. The intent of the contract was that having been awarded we were to leave the contractor to proceed with the program as he had proposed it, and as it was approved, and we would meet him when he produced the first airplane to see whether or not it performed as we wanted it to.

Chairman Stennis. When you say we, you mean the Air Force.

General Ferguson. We the Air Force, yes. Of course we didn't do quite that, but that was generally the intent of the contract. The contractor committed himself to produce an airplane on a schedule

for a price.

Now in contrast the F-15 is structured in such a fashion that we the Air Force and the program director has explicit visibility of all the technical progress and the financial commitments and everything else that is related to the development of the aircraft, and we have milestones that are introduced so that the contractor proceeds to a certain point, and "we" collectively, the contractor and the Air Force and the Secretary of Defense if he likes can take a look to be sure that we have made the kind of progress we want, and that we are satisfied that we have the technology in hand to go to the next step.

Having gone through the developments of the F-15 in this case, but using the C-5A as an example as you asked, we moved down to the point where we flew the first airplane and having satisfied ourselves that it is in fact what we want, and that we have full control of the technical difficulties, we then asked for the authority to proceed with

production.

Now, General Bellis can describe this in far more detail than I can, because he is deeply involved. He is the man in charge of the F-15. There may be some other features to the procedure that he would like to mention that would be helpful to you.

Chairman Stennis. Let's call on General Bellis to supplement your

remarks.

General Ferguson. Yes.

Chairman STENNIS. I want any Senator, whether he is a member of this committee or not, to be able to read this testimony and get some idea of the situation. All right.

General Bellis. Senator Stennis, I have about four viewgraphs here that I think would bring this, if you care to spend about that

much time on it, about 5 minutes I could bring this into focus if you would care to.

Chairman Stennis. I would be very much interested. Pardon me just a minute, now. Before you do that, complete the printed record here and supplement the General's remarks in such a way as you see fit.

General Bellis. Yes, sir. Of course, the streamlined management in this particular case places me in responsible position with the authority and the accountability to carry it out, and of course this has been advertised to all people and as far as I am concerned from where I sit it is working and it is working as advertised. It has been tested a number of times, and in fact the system of giving me the authority and holding me accountable is right and proper.

With respect to the way the program is laid out, it has to do with sequential decisions rather than the total package where the whole thing is made in addition at the very beginning. We have a number of sequential steps at which not only the administration Department of Defense but you and Congress have a review, an ability to decide whether or not to continue, whether or not to pick up the next step, whether or not to delay it because of incomplete demonstrations up to that point.

Could we have the first slide, please.

The basic part of the contract is that it is oriented to specific achievements, and we have in fact given the contractor both the engine and the airframe contractor authority to proceed on the development. We also if you will in layman's terms, although it is a part of the contract, we have options for production, and these were negotiated in the competitive environment, so that we do have a competitive environment to contract follow-on options that are available to the Government, but the Government in no way is obligated to pick up these options until the contractor has actually performed to the Government's satisfaction to the demonstrated milestones that I will show you in a few moments.

In addition to this, we have laid out a very conservative program, as I mentioned this morning, and that is to not have concurrency, to move it on down to where we will have developed and demonstrated before we actually go into production mode, and to limit our retrofit

liability.

The commitment is not only at my level, but I do not come back up to the Secretary of Defense. He in turn in relationship to you here in Congress, for actual production go aheads or commitments for production in any way until we come to you with a demonstrated success in these milestone.

The contract we presently have is structured in three separate ways, although it is one basic contract. We have cost reimbursement with incentive features in design, basically the paper work part of the effort.

It also has fiscal year limitations to it, so that the contractor cannot come back to us during these early fiscal years with exceedences in his cash flows of those years. He has to forecast ahead so it is like a fixed price contract except that he does not have the liability to his corporation in an environment of uncertainty such as a sophisticated program like this.

When we get to any hardware fabrication efforts, including the test aircraft, and the aircraft going to the operational inventory, these are fixed price type of items in the contract, so that we actually have tar-

gets and ceilings on all hardware deliveries.

Now this is the development program, the design, paper work, and the test aircraft deliveries. That is what we have given him authority to proceed with. We have got to give him authority to proceed with this although we do have it as a negotiated option as well as follow-

on wings as part of our original contract.

It does have special provisions. He, McDonnell Douglas, has total system responsibility of performance parameters including the Government furnished engine. That engine we will accept as a static engine demonstration at the contractor's facilities as far as the engine is concerned but through a contract tie in between McDonnell and Pratt Whitney that engine not only performs on the ground in a static test demonstration but in the airplane where we get sophistocated maneuverings and we have air flow distortions across the engine, these types of environments, a dynamic environment.

We have a limitation of Government obligation. Here again he has to forecast some 17 months in advance each March, and as of right now since March 1st is past it is now 29 months that he has to forecast in advance, and then and only then after that time period can he worry about increases in the program, even in the cost reimbursement contract, so that our budget is stable during these time frames, and he has to actually borrow money at his own expense, if he exceeds these

limitations of the Government obligation.

We also have allotment of funds in sequence according to the demonstrated milestones.

We do not have a sophisticated formula for abnormal fluctuations in economy. Our contract is in "then year" dollars, meaning dollars that we forecast will buy the program in the future time frame.

In negotiating the contract, we incorporated the fiscal year values using approximately a 4-percent compounded inflationary factor. Therefore, if past trends continue, the normal economic growth is

already in the program.

If inflation flattens out, we should come in under target. We are trying to come to Congress with a realistic program in the dollars that we forecast will buy the program. Restated, the program is in dollar values that we expect to be required in our budget request.

Chairman Stennis. If you will just stick to that now, and not be tempted to change it, it will do a lot of good. It will certainly help

the military program as a whole.

General Bellis. My instructions all the way along, Mr. Chairman, have been, one, be conservative, be realistic, and from your position as program director you come forward with what you think you can do and what you can manage and then you are going to be held accountable for managing, and I am not in a marketing position. I am not supposed to sell. I am supposed to show a program that if it is needed, and both Congress and the administration feel that it should be carried on, that this is what it is going to cost.

We have a couple of items or one item here, an award fee feature that NASA has found important in their type contracts that we are

seeing if it can help us a bit.



Let's go to these demonstrated milestones.

Chairman Stennis. If you will excuse me, I have to go vote. I expect to come back immediately. If we run into a double vote I will call.

(Short recess.)

Chairman STENNIS. Gentlemen, we were discussing the layout and the operation of your new system, and we were applying it to the F-15. Senator Goldwater, I imagine you will be interested in this. It will doubtless be referred to in debate.

They have an additional chart here. All right, proceed please,

General.

General Bellis. Mr. Chairman, this is a sequential time phase chart to show the accomplishments in sequence that must be performed before the next decision point. This is the decision point January 1, to give a go-ahead to the development program. The next decision point that we will come forward with is at this green star at this point. You can see it is already 3 years from the development start.

Then it is for long-lead release, and if you notice, the long release for production for the inventory is about 3 months after first flight, but we don't obligate for the total fiscal year 1973 aircraft buy until

approximately 7 months after first flight.

Each one of these items that we show here by an arrow, although they may not be accomplished on the month that we show it here, this is our plan, it may be accomplished here or here, but each one of these by contract, these are contractual requirements, must be technically demonstrated to the satisfaction of the Government before we are obligated with the contract to either pick up the option, to proceed with producion, or to redirect the contract or to continue it, but you can see these kinds of decision points, and then the rest of them through the rest of the program are in sequence such that we keep a low production rate. Our actual fabrication rate for the first year and a half is about one every other month for test aircraft. Then we go to one a month, then we go to three a month, and it is only out here at the beginning of calendar year [deleted] that we obligate funds to go to max rate of [deleted] per month and we are even holding down our max rate production so that we can actually be in a conservative production position.

Then out near the end of calendar year [deleted] we ask authority to buy the second wing. In the testimony before the Cannon subcommittee, the question was raised well, if it is such an important program

and you need it, why such a conservative type of an approach.

It is our position that it not only is conservative, but in a way we feel it is the best way to put it in the inventory, because it will reduce the number of retrofits, reduce the number of aircraft delivered that are down for retrofit, so that effectively in a single manufacturing operation we will have not lost time of; yes, having aircraft but they are not operationally available.

We don't think that the total schedule conservatively actually reflects the true picture because of this less down time for retrofit from

previously produced airplanes.

Senator GOLDWATER. Can I ask a question at that point?

General Bellis. Yes, sir.

Senator Goldwater. How many F-4s will you have in the inventory in November of 1974?

General Low. [Deleted] that is UE. In other words, we will still hold to [deleted] squadrons, Senator.

Chairman STENNIS. All right, proceed please.

General Bellis. Yes, sir. Now during the break, Mr. Braswell asked that I add this chart to show the various ways of costing, and in the sequence of milestones what happens if you don't pick up these followon options. There are three ways of describing the cost of an airplane. There is the flyaway cost, and that is the cost of just the airplane that we buy. When you add the support and spares you get what we call unit production cost. This was the costs after the development is completed to buy airplanes for the inventory. Then if you add the development cost and prorate it across all items produced you get what you call the unit program cost. If you only buy the first option, that is, the first wing, it will cost you [deleted] million per airplane, but if you then can spread this development cost over a larger number of airplanes, you get out to [deleted], you get [deleted]. Or if you are selling instead of buying and you want to talk unit fly away you get down to a [deleted] million airplane. But this is a chart that we prepared again for the Cannon Subcommittee to show the various ways of referring to an airplane and the various ways of showing how they cost different numbers according to different buys.

PROJECTED COST OF TF AIRPLANE

Senator Goldwater. Do you plan a T-15?

General Bellis. TF?

Senator GOLDWATER. A TF?

General Bellis. Yes, sir, a two place TF.

Senator GOLDWATER. How many of those do you plan?

General Bellis. I believe it is about 10 percent of the force, and it is according to how many we buy, but I will correct the exact number.

Senator GOLDWATER. What would the difference in cost be?

General Bellis. In cost? Senator Goldwater. Yes.

General Bellis. Again I would have to put——

Senator GOLDWATER. Will you furnish it?

General Bellis. I will furnish it for the record because you get into the various numbers game, but I will furnish it for the record.

(The information follows:)

We plan to buy a total of [deleted] two place TF aircraft. The cost difference between the two place TF aircraft and the one place F-15 is approximately \$100,000.

Chairman Stennis. You may proceed. Anything else? Will these charts show in our records?

General Bellis, I will make them available.

Chairman Stennis. I wish you would, please. That is very good. (The charts follow:)

ADVANCED TACTICAL FIGHTER

PROCUREMENT CONCEPT

ONE CONTRACT WITH THREE DISTINCT ITEMS

● COMBINED CPIF/FPIS

ITEM 1 CPIF

• DESIGN OF AIRCRAFT, AGE AND TOOLING

ITEM 2 FPIS

CAT I & II TEST AIRCRAFT

SPARES AND AGE TO SUPPORT TEST PROGRAM

• 1st wing of operational aircraft

FSIS AD

ADVANCED TACTICAL FIGHTER

SPECIAL PROVISIONS

TOTAL SYSTEM PERFORMANCE RESPONSIBILITY (SPR)

▶ LIMITATION OF GOVERNMENT OBLIGATION (3600)

MALLOTMENT OF FUNDS FOR PRODUCTION OPTIONS (3010)

ABNORMAL FLUCTUATIONS IN ECONOMY

D AWARD FEE

DEMONSTRATED MILESTONES

A 151=

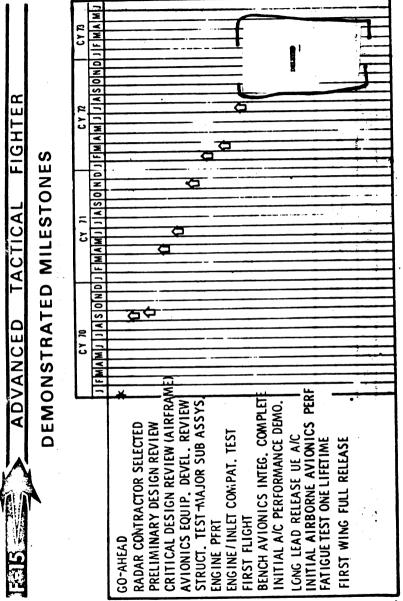
ADVANCED TACTICAL FIGHTER F-15 MILESTONE CONCEPT

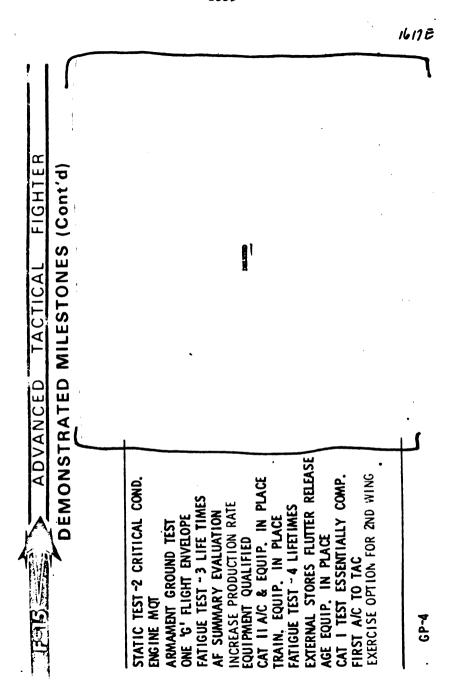
PRIME CONTRACT ORIENTED TO SPECIFIC MILESTONE ACHIEVEMENTS

CONTINUATION BEYOND A MILESTONE CONTROLLED BY ACHIEVING THE MILESTONE

PROGRAM COMMITMENT LIMITED BY CONFIDENCE DEMONSTRATED AT MILESTONES

HEADQUARTERS REVIEW TIED TO FUNDS ALLOCATION





J. S. ADVANCED JACTICAL FIGHTER	IACTIC	A! FI	GHTER	
AIRCRAFT CUM AVERAGE UNIT COST	ERAGE	UNIT CO	ST	
THEN YEAR DOLLARS (IN MILLIONS)			CUR PROG AT TARGET	
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SUPPORT	GLETTIO	. Germa		Parameter 1
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TEST AIRCRAFT		•	20	
DEVELOPMENT/TEST COST			\$1778, 6*	
PROGRAM UNIT COST		DELITE OF		
* ASSUME CONSTANT	A CHARLES OF THE PARTY OF THE P	COMPANY FOR RESIDEN	PERSONAL PROGRAMMENT BURGARIO PARENTINAL	Care Creening

Chairman Stennis. Does this tell the entire story in broad outline about this F-15?

General Bellis. Yes, sir; in broad terms. We spent some 2 hours with your subcommittee, and we have spent about a day with the subcommittee staff.

Chairman STENNIS. You don't know what it is going to cost. It seems to me you gentlemen should always, when you testify, put the conditions in there.

General Bellis. Yes, sir.

Chairman Stennis. The testimony may be held against you some day.

General Bellis. With respect to the first wing we do not have any

abnormal fluctuation.

Chairman Stennis. When was this first authorized?

General Bellis. One January we went on contract, Senator Stennis. Two years ago is when we first came to Congress with our first set of figures, and here in your recent release the early part of December concerning our \$1.6 billion overrun or growth or whatever it was, that is between our early paper studies versus what we were about to go on contract with.

Chairman Stennis. Those things don't look good. They are not really what they say.

General Bellis. No. sir.

Chairman Stennis. And you have just got to get some different words. I wouldn't make those early estimates in firm figures. I would put it within the range of so and so.

General Bellis. Yes, sir.

General GLASSER. Mr. Chairman, I might add to what General Bellis has said that in regard to these figures in the SAR we have all had some difficulty with these. The Department of Defense and the services are reviewing that problem right now, and we will be coming to you with some recommended revisions to the SAR format so that some of these deficiencies will be eliminated in the future.

(Information follows:)

We are currently working with OSD on proposed changes to make the Cost Section of the SAR more understandable and representative of the program cost, and to make the SAR in general more meaningful and helpful. The more significant changes we have proposed and are discussing within DOD are as follows:

1. For those weapon systems still in the planning phase—that is, before they go on contract—we are recommending using only the most recent planning estimate rather than the original one. This recognizes that pre-contract planning estimates should not establish a baseline from which to measure program change. The baseline to measure changes should be, and would be, under our recommended approach, the estimated costs at the time the system went on contract,

2. We are recommending a methodology for determining changes in program costs that would provide a revised estimate not only for quantity changes but also for other reasons for changes in costs, such as economic, schedule, capability increase, etc. Cost changes attributable to quantity changes would then be appropriately treated along with the other reasons for change. We would substitute this more comprehensive methodology for the current column on "Planned Cost Current Quantity," which attempts to consider only quantity changes.

3. The need for the FYDP columns in the SAR is questionable since many pro-

3. The need for the FYDP columns in the SAR is questionable since many programs now extend beyond the FYDP, and it is the total program cost estimates with which both DOD and the Congress are primarily concerned. A portion of these costs to cover only the FYDP, period can be confusing and misleading.

Chairman STENNIS. I hope so because it is misleading to the public. Maybe the Congress is too insistent on putting a price tag on everything to start with. It is very clear that it can't possibly be done. All right, if you are through on that, I have some questions here on the B-1.

Thank you very much, General.

DEVELOPMENT OF B-1

I address this to either General Ferguson or General Glasser. It is the understanding of the Chair that at the present time the Air Force has not fully decided what type of aircraft it desires for the B-1. What is the point at which production will proceed? You gentlemen comment on those remarks.

General GLASSER. On the basis of the presently planned program, we would be looking for a production go-ahead decision in [deleted], so that would be some time in the offing at this point. Your comment in regard to not knowing exactly what we want, I am sure, is in the context of the contractual knowledge of what we want.

Chairman STENNIS. Yes.

General Glasser. We have studied the B-1 program in great detail, and we feel that we know specifically what we would like to have in a B-1, but naturally until we complete evaluation of contractor proposals we can't state precisely each term. However, I think we will be in a good position to do so at that time.

ELECTRONIC SYSTEMS

Chairman STENNIS. These decisions you have to make on electronics—I am not claiming that I know anything about electronics—but you want to accomplish a certain objective as I understand it, and the tendency is always to put more and more into it. What is your situation on this B-1?

General Glasser. When we looked at all of the different things that people might like to see in the airplane, and which we can demonstrate as being desirable to have as part of the mission requirement, we come up with something in the vicinity of 10,000 or more pounds of electronics as you indicate.

General Ferguson's people, working with the Strategic Air Command, conducted an analysis of these systems some time back, and said an evolutionary program would be a much more rational way to go

about this.

They eliminated nearly half, in terms of weight, of this amount of electronics, and said the airplane should be configured in its initial phases to have only that increment of the electronic equipment, but retain its space and the weight carrying capability for growth. Historically, a growth capability has proven to be necessary as the enemy threat becomes better defined with time. The progression of the avionics industry is such that the general direction in which we are moving at this time appears to be correct. That is, we will start out with a basic suit of electronics on board and with space and power to grow if and when it becomes necessary.

AIRCRAFT CAPABILITIES

Chairman Stennis. What about your range and speed? Have you

reached a firm decision on those items?

General Glasser. Yes, sir. The aircraft has a basic design mission range of [deleted] nautical miles. So far as speed is concerned, it is to be [deleted].

Chairman Stennis. You have already determined the size?

General Glasser. Within a reasonable degree, yes, sir. The airplane is in the 360,000 pound class as an all up gross weight airplane.

Chairman STENNIS. When do you make decisions about motors, es-

sential items such as the motors?

General GLASSER. These decisions are currently scheduled to be made during May of this year. We are in the source selection phase at this time, and we are evaluating the contractors' submissions.

General Ferguson. Yes, the request for proposal went out to industry in November, Mr. Chairman, and industry of course has been pretty well set anyway. We are in the process of evaluating their responses right now—three airframe contractors and two engine contractors. The decision to select one contractor for the airframe and one contractor for the engine is set for May of this year. The avionics later on. I think August of this year.

ALLOVER APPLICATION OF METHOD

Chairman Stennis. Gentlemen, this modus operandi you gave us of the F-15 contract, do you apply that procedure now to make it fit all

your other major contracts?

General Ferguson. The same principles will apply, Mr. Chairman, but in the case of the B-1, we are not at this time including a production program. We are going to go through the development phase first of all. The principles of management, nevertheless, are included. They are modified to suit the particular technical challenge. [Deleted] is the date for decision on production go-ahead, and an initial operational capability could be achieved during 1978.

Chairman STENNIS. So the Air Force applies this new method to all of its contracts over a certain amount. Where is the dividing line?

General Ferguson. We will apply it wherever we can in the interests of good management regardless of the level of expenditures.

Chairman STENNIS. With variations as you pointed out like the B-1.

General Ferguson. Adjusted to suit the situation.

Chairman STENNIS. Everyone seems to agree that the C-5A was not the proper way to start this new type of contract. It is too large a contract. That is why I was asking about the sizes. Your system will fit large or small contracts with variations, is that right?

General Ferguson. That is correct.

Chairman Stennis. And that is the way you expect to apply it?

General Ferguson. Yes, sir.

Chairman Stennis. All right. I wasn't here when they got into this with the Army. Does the same method apply to the Army procurement? The big program they have is of course the ABM now. Are they opting under the same system?

General Ferguson. I have had discussions with my Army and Navy counterparts recently about this subject in general, and I know that they have been requested to look at this particular arrangement, but it is not unique. It is to some degree the way we were doing procurements in years gone by.

Chairman Stennis. What about the F-14? Does anyone know about

General Ferguson. I think the Navy is the best agency to describe that, Mr. Chairman. I don't know. General Bellis I think has an idea of how it is done.

Chairman Stennis. I never have gotten accustomed, gentlemen, when you ask one of you something about the other services it is just like speaking a different language. You don't go into each other's business, not here at this table anyway. Mr. Braswell, you notify the Navy that we want them to explain their system in commonsense terms that can be understood at the street level. We want to put it all in the record here so it can be depended upon.

EFFECT OF REDUCTIONS AND CUTBACKS

I was impressed with the fact that you said you were asking for fewer planes than at any time since 1935. How does that leave you? I think you ought to be frank and tell us. I am not suggesting we will give you any more money, but we want to know the effect of these reductions and cutbacks.

General Glasser. What this allows us to do is to buy out the quantities for the force structure that has been approved, and to buy the attrition aircraft as we foresee them. May I ask General Low, our

director of programs, to speak to this point?

General Low. I think there are a number of points Mr. Chairman that we might want to enter in the record. I am sure everyone knows that the number of aircraft in the inventory is decreasing substantially, because we are not procuring more at this time. Of course there will be further decrease in the future.

Chairman Stennis. Yes, but just to say that it is a decrease doesn't carry the meaning to me that it does to you. Specifically, how many

F-4s have been consumed in some recent 12 month period?

General Glasser. We will buy only 24 F-4s this year, which will be attrition aircraft only. If we lose more than that, we will have to eat into the available resources.

Chairman STENNIS. My question really was how many have you

used up in some recent 12-month period?

General Low. We have that number, sir. There were 90 F-4 losses in CY 1969. I would say also then that it does not permit us to modernize our forces. That has quite an impact. It has an impact on the active forces and also on the reserve and guard, because they depend on—

Chairman Stennis. Well, you are getting the two things you most

want as I understand it, the B-1 and the F-15.

General Glasser. Yes, sir, but the point on those

Chairman Stennis. And you are getting the MINUTEMAN III. General Glasser. The point on those aircraft, however, sir, is that they are very far out in the future. We are making a start, and we do appreciate the opportunity to undertake this modernization in which

we have had such a long gap. We won't have the F-15 in the inventory

for 4 or 5 years.

We won't have the B-1s until later. The bringing in of the MIN-UTEMAN III is certainly an improvement. It will enhance our capability substantially. But if you look at the procurement program for this year, you find that the modernization of the aircraft force is restricted to the 88 A-7s that are going in and the 40 F-111s or whatever reduced number that turns out to be. That is about the extent of modernization that we would have, so it is a very very limited modernization. Practically everything is to hold what force we have available.

Chairman Stennis. Does this mean then that we are just postponing the purchase of the planes that would keep you up to par, and we

will have to do it next year or soon, to make up?

General Glasser. I would say that what we are doing, sir, is spending our moneys in the procurement accounts as prudently as we can to hold the force together while we are undertaking these new developments that we would hope would give us a modernized force.

POWER LEVEL AND STRATEGY CHANGES

Chairman STENNIS. Senator Goldwater, what do you think is a fair balance between this new procurement and maintaining the level?

I would like to get your opinion. I think it would be worth a lot. Senator Goldwater. Mr. Chairman, I haven't addressed myself to this, but I think we are making a mistake. I have discussed this briefly

with the Secretary.

We have talked about a two and a half war capability, and in my humble opinion we never had a one and a half war capability, and now if I understand it correctly we are going to wind up with 19 wings, and we should have 30, and I don't think we can go much below 30 and say we have a one and a half war capability.

It is true that weapons and aircraft are costing much more than they ever have. This is a factor that we have to consider, but I think we also have to consider our worldwide commitments, and if we expect to remain attached to those commitments, I don't think this bud-

get or this authorization is enough.

I don't know exactly at what level it should smooth this off, but I don't like to sit in 1970 and see an Air Force buying fewer airplanes

than we bought before we had an Air Force back in 1935.

On the other hand, we don't have to go crazy, but our potential enemy, contrary to what we hear occasionally, I think is equal to us in technology, in airframes and engines. She may even be ahead of us, but they are not holding back a bit, and as long as they are going ahead, I see no sound reason for us to go back.

When we hold our executive hearings on this, I will speak more to it, not that I would have any specific amendments, but suggestions. I don't know yet what the tactical subcommittee is going to come

up with.

Senator Cannon has held some very excellent meetings, the best we have ever held, and I think out of that will come more discussion along the lines that I have mentioned here.

I speak this way for all the services. We are very, very underequipped in the Navy. The Army I know is planning a smaller Army for the 1980's, and I think it is going to be a very interesting development. General Westmoreland has addresed himself to this twice, and when we can finally clear the decks of secrecy, I think the public can understand what we are getting at.

The whole military budget this year I think has been cut too drastically, and I think you and I know why it was cut, to sort of get there before the antimiltary people do, but I think we could justify

more money. That is my feeling on it, Mr. Chairman.

Chairman Stennis. That is a very good comment. I am certainly glad you made it.

PROCUREMENT FUNDS FOR FREEDOM FIGHTERS

General, you have an item in here for \$30 million for procurement of this so-called Freedom Fighter. What have you done about selecting the plane?

General Glasser. That is correct, sir.

Chairman STENNIS. How far along are you on the plans?

General Glasser. We have recently released the Request for Proposals to the interested bidders to submit their proposals, and we will be selecting by this summer the contractor to go ahead with this program. The initial financing of this will include the \$28 million of fiscal year 1970 funding, and the \$30 million that we are asking for at this time.

Chairman Stennis. But you are not putting it under the formula

that you have been explaining to us, are you?

General Glasser. No, sir. This is a relatively simple off-the-shelf procurement where development is very, very limited. We have brought that rather sharply to the contractor's attention both by the IOC dates that he must meet, and by the fact that we have put a very limited target to ceiling cost range in the contract, with a 70/30 share arrangement on it. If the contractor injects anything in the contract that is very risky, that will cause him to incur higher costs than he thinks, he is very soon in trouble.

Chairman Stennis. As I get it though, if I understand your system,

you make an exception here as to this particular plane.

General Ferguson. We are not making an exception. We are tailoring it to suit the particular purpose, because in this instance we are looking at airplanes already in existence or in essence derivitives of things in existence, but the management principles will apply there, Mr. Chairman.

The milestones may not be quite so definitive or will adjust in accordance with what the objectives of the procurement are, but the principles of management will be applied as appropriate to this

program.

General GLASSER. In this particular program, Mr. Chairman, we will be very nearly at the position when we let the contract that General Bellis described as being at the completion of his development phase, at which time he wants to go under fixed price options. We are tailoring this procurement approach to this specific case. It seems to be different, but it is a special case.

Chairman Stennis. You used the words "off-the-shelf." As I under-

stand that, that is like going in a store and buying the product.

General Glasser. Very nearly we will be in that position. The only way that an aircraft company can be responsive to the Request for Proposal that has been put out for this aircraft is to take an existing airplane that he has available today, and makes modifications to it. Otherwise he will not be able to meet either the costs or the schedule of the program and be competitive.

Chairman Stennis. All right, this is going to provoke a fight on the floor, or it may, so I want all these points brought out now and fully

covered in the testimony.

Do you think this Freedom Fighter is fully covered now in the

General Glasser. I believe so.

Chairman Stennis. No points have been overlooked? Do you think

so, Mr. Braswell?

General Pitts. Mr. Chairman, if I might intercede, if we think of some additional points we will amplify it in the record for you.

BREAKDOWN OF FUNDS APPROPRIATED

Chairman Stennis. Last year the Air Force received authorization for \$28 million for the Freedom Fighter, but no specific funds were appropriated therefor. Now where did the Air Force obtain this \$28 million and how much has been obligated and how much has been spent so far?

General Prrs. In the formulation of the 1971 budget, Mr. Chairman, in our 1970 column of the 1971 budget, we identified \$28 million in the aircraft procurement account that had been made available from other programs and we identified it against this line item.

Chairman Stennis. Where did you get it?

General Pitts. From the aircraft procurement account, sir, as the Congress instructed us to, and it was taken from other programs that had been reduced.

We put a line item in the 1970 column in the 1971 budget against International Fighter, for \$28 million, and requested \$30 million in this budget. No funds have been either obligated or expended at this time.

Chairman Stennis. All right. Now this year you are requesting \$30 million additional for a total of \$58 million.

General Glasser. That is correct.

Chairman STENNIS. You said virtually nothing was needed for R.

& D. Could you give a figure of any kind on that?

General Glasser. At this time we are not carrying any R. & D. money. Until we see the submissions by the contractors as to what modifications they are going to want to make to these off-the-shelf aircraft, if you will, we cannot break out the amount of this that would be R. & D. funded versus that which would be procurement funded.

General Pitts. I might just add to that, sir, that the Congress in its wisdom last year put language in the bills, both authorizing and appropriation bills, that would allow us to use those funds for R. & D.,

Chairman Stennis. You haven't identified any yet.

General GLASSER. No, sir; we haven't gotten the proposals back from the contractor.

NUMBER OF PLANES TO BE PURCHASED

Chairman Stennis. How did the Air Force determine that [de-

leted] Freedom Fighters may ultimately be purchased?

General Low. I think what we did, Mr. Chairman, was take a look at those nations which would probably operate this type of equipment, and then estimated what kind of a force they could be expected to operate in the time period when it would be available and just added them all up. This total gives the request to industry—something to hang their proposal on.

General GLASSER. I might amplify, Mr. Chairman, if I may, that this was a number generated in the Department of Defense with the assistance of the Air Force, and contemplated the requirements for

the Southeast Asia recipient countries and Korea.

Chairman Stennis. What countries were they? If you don't have

that with you will you supply it?

General GLASSER. I don't have the details. I can name some of them—Thailand, Vietnam, Korea, Taiwan. I would have to get into the details of it and give you a specific listing of the entire [deleted].

(The information follows:)

This listing follows: South Vietnam Thailand South Korea Taiwan	[deleted] [deleted]
Total	[deleted]

(Note.—It should be emphasized that the figures cited are only estimates at this time. They are presently being studied by the Department of Defense and will be validated and briefed to the Defense Systems Acquisition Review Council at their next meeting on the International Fighter aircraft, now scheduled for early June 1970.

Chairman Stennis. Mr. Braswell, you call that list to my attention

when it comes in. You could not have added up the [deleted].

General GLASSER. I might comment at this point, Mr. Chairman. The way in which we are structuring our request for proposal and this would be reflected in the contract, is not pegged to the number [deleted], but allows us a very wide option to get essentially the number that are required. We needed a number like [deleted] to be a basis for evaluation. Otherwise we would have had great difficulty in selecting among the contractors.

Chairman STENNIS. These matters that seem simple to you are sometimes the most difficult to handle on the floor. I think this will be one that causes more trouble than it would be worth when there are so many more important projects to debate. Senator, do you have

anything else that comes to mind?

MULTIMODE RADAR

Senator Goldwater. Just one question. I was not here for the testimony. I apologize. We have Space hearings, too.

Chairman STENNIS. That is all right.

Senator Goldwater. In the C-5 program, I notice that you are having difficulty with the multimode radar antenna. Why do you need

multimode radar? I read further that the trouble was in the ability of the radar to observe and track directly under the ship to the horizon.

General Ferguson. May I ask Colonel Beckman to respond?

Colonel Beckman. Yes, sir.

As I think you recall, we are using the multimode radar. We actually have the two band, KU and X bands, and in each of these frequencies one frequency is devoted to a primary mode and it also serves in a secondary mode.

The problem we ran into here was that we saw holes on the radarscope. We might see a hole, for instance, at 25 miles out. We might see another hole out at 100 miles, and we saw a hole beneath the aircraft.

Now we could navigate manually, and when we get to the hole dead-

reckon ahead to the next target that we saw on the screen.

However, when we considered that the multimode radar is tied into a computing system to give us automatic navigation, whenever we ran into the hole then the computer actually had to go to memory, which would decrease the accuracy of navigation during that portion of the mission.

Now when we navigate at low altitude, we need the information close into the aircraft, so that we can navigate around peaks, terrain

follow, if you will.

The problem that we ran into earlier in the program was that Lockheed ran into a mechanical interference problem, and had to shave their antenna. When they shaved the antenna, they did not redesign the feed horn, the piece of hardware that splashed radar energy against the antenna, and as a result since there wasn't any antenna in several sections, the radar energy was lost, and was not reflected to the ground.

What has happened now is that we have redesigned the radar horn to redistribute the energy that hits the antenna so that all the energy will hit the antenna, be reflected to the ground and back to the antenna.

This feedhorn modification that we are testing at the present time, it looks good to us. We need more test data to confirm that it will cut out all of the shadows at all altitudes, that it will, in fact, have

no holes from zero all the way up to about 35,000 feet.

Our test results thus far are very good. We have essentially no holes at the present time, and we would expect, we are hopefully expecting that we will be able to get ourselves out of the bind we are currently in with just this feed horn redesigned. If, in fact, we run into dynamic range problems, then it may be necessary to redesign the antenna itself.

The feed horn redesign is a relatively simple one that can be done, and if it works out it will be with us in the next 2 to 3 months. The antenna redesign, if it were necessary, is about a year and a half away, and it is considerably more expensive than the feed horn redesign. I hope I am not being too complicated.

Senator Goldwater. No, you are not at all. I follow you, but the purpose of my question was directed at the overall growing problem

of the black boxes.

General GLASSER. Yes, sir.

Senator GOLDWATER. In other words, do you have to have this in order to get from point A to point B? I am not just including the multimode radar, but many, many of our concepts that we have got

such as terrain-following radar in the C-5. Why we need it in that, frankly, I don't know.

General Glasser. Senator Goldwater, let me take you back a while

to the origin of the C-5.

Chairman STENNIS. Speak just a little louder.

General Glasser. The C-5 at its inception was designed to support the Army in a number of missions, that is, operating in forward areas with unprepared fields, no ground-based navigation, in all weather conditions, and so forth. This resulted in a rather elaborate set of

subsystems on board the aircraft.

General Ryan has very recently asked the very question that you have asked here. He has a group of people in the Military Airlift Command and on our staff at headquarters, combing down through all of these subsystems, and asking if these systems are all needed, and if money can be saved by eliminating some of them. I have no answer at this time other than assuring you that the question is germane, and it is being looked at in considerable detail.

Senator Goldwater. I am glad to hear that you are studying this, because if I hear one thing from pilots flying in Vietnam and returning that I have seen over there, they wish to God we could get rid of some of the black boxes and leave the decisions more to them.

In other words, get back to the original intent of an airplane. A fighter is supposed to be a fighter and able to fight, not carry

along 10,000 pounds of black boxes in a C-5.

I know what its original intent was. I think it will do it, but when you get to looking at the Mark II carry-on for the 111 I think it is

what, \$4 million? That is a lot of money for a radio.

General Glasser. I might also comment too that the Secretary appointed an ad hoc group of the Scientific Advisory Board to look at the C-5 wing problems. In connection with that, he has now asked Dr. Bisplinghoff, who is the chairman of that group, to expand the membership of his ad hoc group to look into these various subsystems that we have been talking about here, to expand their technical studies at this time. One of the results of that would be a recommendation as to whether this is worth bringing through to completion, or should it be dropped at this point?

Senator GOLDWATER. How far along are they on that?

General GLASSER. On that portion of it? Colonel BECKMAN. On the avionics? Senator GOLDWATER. The whole thing.

Colonel Beckman. We have had 2 days' meetings. On the 21st and 22d of February, sir, we met the first time, and they are meeting again this weekend, Saturday and Sunday to discuss the airframe structural problem, and hopefully two other panels will also be there, one to evaluate aircraft performance and another to evaluate the airframe avionics. We haven't finalized I don't believe on the avionics committee.

General Glasser. That is correct, but we hope to have them by this weekend.

Colonel Beckman. Possibly three panels this weekend.

Senator Goldwater. I would like to suggest that the chairman keep in touch with these committees so that at the appropriate time we could be briefed on it. I know you are interested in costs. We are all concerned with costs, and the greatest possible field of reductions in my mind would be in this general field of avionics.

I would like to feel that the Armed Services Committee could be kept abreast of these developments. I think it is a very wise move on the part of the Air Force to start looking at the insides of their own equipment.

Chairman STENNIS. I am certainly encouraged to learn that they are. You frame the request now that you think will cover it and we will

adopt it as a committee request.

Senator Goldwater. I don't know the name of the committee.

General Glasser. It is the ad hoc group of the Scientific Advisory

Board chaired by Dr. Blisplinghoff.

Senator Goldwater. The staff has heard the name, and the name of the committee, and I would merely request that at the appropriate time the staff set up a briefing for the Armed Services Committee on the progress made by this committee.

Chairman Stennis. All right, we will certainly be glad to have that. Does the Navy have a corresponding exercise for examination of these

matters?

Senator Goldwater. I think they have. I think we heard one of the Tactical Air Subcommittees asking the same question about the A-6 program and the modified A-6. Didn't they tell us they were looking into that?

Chairman Stennis. All right. Let me know about that so we can get

together.

General Glasser. If I may add a footnote. Chairman Stennis. You certainly may.

General Glasser. In this connection, recognizing your interest in these other groups, we do have within the Air Force a very similar group, in fact a predecessor group, an ad hoc group of the Scientific Advisory Board under the chairmanship of Prof. Holt Ashley from Stanford.

His group was originally convened to look at the wing box problem on the F-111. He was reconvened to look at the pivot fitting problem that was described here earlier today. Because of his considerable knowledge of that effort, he was then asked to take another look at the F-15 structure, and to validate that for us in advance, so that we may hopefully predetect any of these problems that might be built into the design there.

Chairman Stennis. Gentlemen, getting at these estimates, here is an

illustration.

(Discussion off the record.)

PREPARED QUESTIONS FROM SENATOR STENNIS

(Questions submitted by Senator Stennis. Answers supplied by Deartment of the Air Force.)

Question. General Ferguson, as I understand what you are saying, the 1970 buy of F-111s completes the current contract. The 40 F-111s in the 1971 request will require a new contract. Is that correct?

Answer. That is correct, Mr. Chairman.

Question. Does the Category I testing include a full system demonstration?

Answer. Category I testing consists primarily of development testing and evaluation of the individual components and subsystems. In addition to qualification of subsystems, the testing provides for redesign, refinement and reevaluation as necessary. The Air Force actively participates in, evaluates, and controls

Category I testing; however, the test is conducted predominantly by the contractor. AFSC conducts Air Force Preliminary Evaluation (AFPE) flights prior to the completion of Category I testing to evaluate the overall system.

Category II testing evaluates the integration of subsystems into a complete system. Testing is accomplished on the complete system in as near an operational configuration and environment as practical. It is an Air Force effort with contractor participation under AFSC direction and control, and with active opperating and support command participation. The primary objective of Category II testing is to determine that the integrated system meets established requirements and specifications for performance, control, maintenance, safety and reliability.

Question. When is the Category I testing program completed? What is the Category II testing program scheduled?

Answer. Category I and II testing of a system is often conducted concurrently. This is the case with the F-111. Both Category I and II testing of the F-111A have been completed except for the stall/spin portion of Category I which will extend into 1973. Category I and II testing of the F-111E, F-111D, and FB-111A is currently under way and is scheduled for completion in late 1971.

Question. You indicate a 1 July 1970 production go ahead. Isn't there a considerable amount of concurrency between R&D and production? When you still have \$46 million in R&D yet to complete?

Answer. July 1970 is the expected go ahead date for the follow-on contract. This does represent concurrency between R&D and production.

Question. General Ferguson, you mention that seven contractor systems for internal management criteria for cost/schedule have been approved by the Air Force.

Does the Air Force have an approved internal management system for cost control at the F-15 contractor?

Answer. The System and Propulsion contractors have established a Cost Control System in compliance with Cost/Schedule Control System Criteria Specifications. This system will provide a cost and performance management visibility for both the contractors and the Air Force. The criteria are under demonstration and are planned for approval in approximately three months.

Question. Has the Air Force approved a contractor management cost system for any Lockheed programs?

Answer. No. None of the Lockheed plants under Air Force cognizance has demonstrated an ability to comply with the Cost Schedule Planning Control System criteria. However, several of these plants are vigorously pursuing the corrections to their systems to enable them to successfully meet the criteria.

Questions. What do you have to preclude the contractor or the Air Force from stretching to meet demonstrated milestones and slipping on other program effort?

Answer. Discrete selection of milestones is designed to prevent this. Progress toward milestone completion is under constant review by the SPO. The milestones themselves represent those critical accomplishments which interrelate to overall system development. Program decision points have been established so that milestone accomplishment is reviewed in context with overall program accomplishment and future funding requirements. Therefore, the proper selection of milestones and effective review processes have been designed to prevent the situation you describe from occurring.

Question. You state that the contractor will have to get his own funding if he goes beyond obligational authority. Aren't we in this position now with Lockheed? What can you do to preclude this?

Answer. In the F-15 contract, the contractor must notify us at least 17 months in advance of any additional funds required. This lead time forces the contractor to evaluate the overall program and inform us well in advance of a projected problem and its magnitude. No funding by the contractor beyond Government obligation limitation should be necessary if the contractor's forecast is accurate and, at any rate, is temporary until the additional funding is obligated to the contract. At the maximum, this could be 29 months from notification. In addition, the demonstration milestones also assist in the prevention of financial problems. The unsuccessful accomplishment of a milestone attributed to technical difficulties exposes potential future financial

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difficulty. The program decision points with their review of milestone accomplishment provides early identification of potential increase in program cost. These two procedures provide the visibility for timely review and control of the financial health of the program. This type of visibility and control was not present in the C-5 contract.

Question. Why must we pay for R&D for a new Freedom Fighter compared to the F-5?

Answer. The F-5A-13 in its present configuration cannot adequately counter the MIG-21 threat. Not only is it inferior in the maneuvering dogfight arena but its low level maximum speed capability also limits its pure intercept capability. Certain modifications are being made to these candidate aircraft in the International Fighter aircraft program to optimize these aircraft for the air-to-air dogfight role, therefore there will be some associated R&D costs. I would like to emphasize that one of our primary goals in this program has been in minimizing costs, while at the same time providing our allies with an aircraft that will enable them to shoulder more of their own air defense. Part of this R&D cost, in this regard, will be in simplifying an existing aircraft so that it can be maintained by the recipient countries.

COMMITTEE RECESS

Chairman Stennis. Gentlemen, we certainly do thank you for very fine testimony. We may be asking you to come back over on something before we mark up the bill. When we mark up the bill, we want everything in there to be able to stand up, and we know you will give us the facts.

Thank you very much.

General Ferguson. Thank you, Mr. Chairman.

Chairman Stennis. Tomorrow we will take the R. & D. for the Air Force, and you will be back with us, General.

General Glasser. Yes, sir; I will.

(Whereupon, at 4:10 p.m., Wednesday, March 11, the committee was recessed to reconvene at 10 a.m., Thursday, March 12.)

MILITARY PROCUREMENT FOR FISCAL YEAR 1971

THURSDAY, MARCH 12, 1970

U.S. SENATE, COMMITTEE ON ARMED SERVICES, Washington, D.C.

The Committee on Armed Services met at 10:15 a.m., in room 212, Old Senate Office Building, Hon. John Stennis (chairman) presiding. Present: Senators Stennis (chairman), Symington, Ervin, Cannon, Young of Ohio, McIntyre, Thurmond, Tower, Murphy, and Gold-

On the staff of the Committee on Armed Services: T. Edward Braswell, Jr., chief of staff; and Labre R. Garcia, professional staff

member.

On the staff of the Preparedness Investigating Subcommittee: James T. Kendall, chief counsel; Ed Kenney, Don L. Lynch, Hyman Fine, David A. Littleton, and George Foster, professional staff members.

DEPARTMENT OF THE AIR FORCE

RESEARCH AND DEVELOPMENT

COMMITTEE PROCEDURE

Chairman STENNIS. The committee will now resume its consideration of the research and development portion of the Air Force authorization request. We have with us today Mr. Grant L. Hansen, Assistant Secretary of the Air Force for Research and Development and again we have Lt. Gen. Otto J. Glasser, Deputy Chief of Staff, Research and Development. In just a minute, Mr. Secretary, we will be glad to hear from you.

Let me say this: Most of you already know that we have a Special Subcommittee on Research and Development that is chaired by the Senator from New Hampshire, Senator McIntyre, and I am going to ask him to preside today. I was going to do that anyway, and sit here at the table. Of course, matters have arisen—they always arise it looks like. I am just compelled today to give attention to other matters that I have been neglecting, but which I can't put off any longer—matters in my own State as well as debate on the floor.

I am going to spend as much time here as I possibly can, but I am going to have to ask you to excuse me. Senator McIntyre, I am delighted at the progress you have made already, and I want you to take the chair and proceed in your own way, subject, of course, to the will

of the committee.

Gentlemen, I am sure you understand my absence is no lack of interest in anything. We had a good hearing yesterday on the Air Force,

and I am very proud of the way it was presented. We had a better presentation than we have had for a while. It is no reflection on anyone, but a better system I think. All right, thank you very much,

gentlemen.

Senator McIntyre. Mr. Secretary and General Glasser, of course, on behalf of the committee I am delighted to have you here today. I think that we will be able to spend a good deal of time trying to find out what the Air Force desires to do this year in the important field of research, development, test, and evaluation.

I suggest, Mr. Secretary, that you proceed with your statement, and any other statement, General Glasser, that you might have, and

then we will get down to questions.

STATEMENTS OF HON. GRANT L. HANSEN, ASSISTANT SECRETARY OF THE AIR FORCE (RESEARCH AND DEVELOPMENT), AND LT. GEN. OTTO J. GLASSER, DEPUTY CHIEF OF STAFF, RESEARCH AND DEVELOPMENT

Mr. Hansen. Thank you, Mr. Chairman. My complete statement was submitted a few days ago to the committee, and with your permission I will just read an abbreviated version that hits on the high points, I believe.

Senator McIntyre. That will be fine, very good.

(The statement follows:)

I. INTRODUCTION

Mr. Chairman and members of the committee. I am happy to appear before this committee today in support of the Air Force Research, Development, Test and Evaluation program request for Fiscal Year 1971. This budget represents our best efforts to formulate a program which we feel respects the expressed intent of the Congress and provides the minimum essential RDT&E elements necessary to insure future national security in the air and space. The budget we present today is more than \$500 million less than FY 69, and \$170 million less than FY 70. Inflation further adds to the true reduction.

In order to provide greater focus to the critical programs and issues we face in the Air Force FY 71 RDT&E effort, General Ferguson, General Glasser and I are concentrating in our presentations on selective aspects of the overall program and activities. I shall address what I sense to be some of the major policy concerns reflected by the Congress in the overall research and technology areas. General Glasser will present, in a more detailed form, the content of our overall FY 71 RDT&E program. General Ferguson will address the major weapon system acquisition programs which we now have under way and will highlight for you the positive organizational and management actions that we have undertaken in order to more effectively administer and control these efforts.

II. RESEARCH AND TECHNOLOGY

Last year the Congress very evidently was troubled by serious concerns about research within the Department of Defense. These concerns manifested themselves first in a very significant reduction in the funds from those granted in the previous year and, second, in the inclusion in the Appropriations Act of a requirement that all research projects and studies bear a direct and apparent relationship to a specific military function or operation. In addition, there were some strong feelings that the Congress should be provided with a prior identification of the research in universities along with a statement of the history of that university's cooperation with the Department of Defense on such matters as ROTC, recuiting, etc. I will try to address these concerns as I understand them.

The first issue which I sense in the mind of Congress is the question of national priority of defense research. Since we sponsor research in so many fields, and since little of it makes an immediate impact, it is reasonable for Congress to ask why we can't reduce the level by 10%, or some larger amount. How can we tell whether we have enough research? I believe that most of the work in research makes its most significant contributions largely through unpredictable applications, and largely at some time in future years. But the impact of research, both our own and that of our opponents, can be decisive. Let me illustrate this by three historic events achieved in the life time of everyone in this room.

First, in 1938, German scientists discovered the fission process of uranium. This gave promise for release of energy about a million times greater than that released in ordinary chemical reactions. Within two years, the Germans and the allies had entered into a race to develop a weapon using this energy. The Germans lost the race. If the Germans had made a few key decisions differently, the course of history would have been altered. Prior to 1938, much of the research which led to the nuclear capability of the U.S. would probably have been judged to have no direct and apparent relationship whatsoever to a military function.

Second, in 1948, a group of American industrial researchers announced the transistor, a device which permitted the control of electric currents in a solid instead of in a gas or a vacuum. The result of this discovery, and its subsequent development, increased reliability and reduced size, weight, and power requirements of electronic equipment to the point where today a single pilot in a fighter aircraft has available for his selective use more information than the entire fighter command of the RAF had during the Battle of Britain. This was an invention of American industry, and for several years this nation enjoyed a technological lead in all those military functions that depends upon electronics and computers. The transistor was the product of research in the electronic properties of solids, but only farsighted individuals saw the direct and apparent relationship of the research to military objectives.

The third event that I wish to cite is the discovery of the laser in 1960. In the early 1960's, the laser was characterized as a "solution in search of a problem." Today, its application to problems in communications, detection and surveillance is fully apparent. In our laser program, we are aggressively pursuing several developments. The laser is the result of basic research, some of which we supported in the early 1950's with absolutely no thought that it could lead to the present applications. That work would probably not then have met today's test of direct and apparent relevancy for military sponsorship.

What point do I wish to make to you? It is simply this: We survive and prosper because we have mastered the use of science and technology, and have applied these to our national objectives. I cannot tell you with certainty that a research budget of any given size will guarantee scientific supremacy. But I can tell you that if we had lost the race for nuclear fission, or the transistor,

or the laser, our fate as a nation would have changed for the worse.

Sponsorship of research is one of the wisest investments this country makes. The very conditions of independence under which research is productive and innovative may permit some research of questionable value. The valuable cannot always be predicted in advance but is, I believe, worth enough to justify supporting all that seems to be good research, whether or not the relevance is apparent. The message of Section 203 of Public Law 91-121 has come through, however, and we have taken steps to comply with our understanding of the intent

For example, our Office of Aerospace Research last year carried out a study in depth of the requirements for research to help solve problems associated with present and future re-entry missile systems. A team of research managers working with their re-entry systems managers identified 41 problem areas where research was needed. A survey of our existing Air Force research program disclosed over 260 research efforts which the researchers felt had a bearing upon the 41 problems. The re-entry systems development managers agreed that some 160 were of most significant interest to them, with the remainder either more appropirate to other systems or not of current interest to re-entry sysems. As a result of this study in depth, the Advanced Ballistics Re-entry Systems (ABRES) commander is instituting a research section in the ABRES annual review to achieve continuing integration of effort, and our research managers are formulating research programs to better meet the needs of ABRES.

I understand Congress to be saying: "We are ready to appropriate necessary monies for defense research and development, but the DOD is trying to do all possible research, even in areas far removed from defense." To address this concern, I would like to describe to you our actions over this past year. These will include those that came about as a result of our review of all work units in our basic research program to ascertain whether or not they comply with Section 203.

First, my staff, General Glasser's staff, and the Air Force's Office of Aerospace Research have given top priority to this review. A panel of our Air Force Scientific Advisory Board, composed of distinguished scientists and engineers from industries and universities, gave comprehensive study to the question of relevance and provided us with their recommendations. The depth of this study is reflected by some of the hard decisions that were made. The social and behavioral sciences, which had figured so prominently in the set of allegedly bad examples in previous years, already had been reduced to the point where virtually all remaining programs were deemed to meet the requirements of Section 203. The subelements which were eliminated or strongly reduced because of Section 203 were nuclear physics and portions of our general physics, astro-

physics, astronomy, chemistry, and mathematics.

We had supported research in these areas in the past because in our judgment they were broadly relevant to Air Force objectives. For example, there are processes going on in stars which release energy in far greater quantities than anything known in our nuclear reactions on earth. Cosmic rays incident upon the earth have energies a thousand times greater than nuclear fission or fusion neutrons. Both of these could conceivably have tremendous impact upon weapons or propulsion systems. Similarly, research on the structure of nuclei has been supported because of our reliance on nuclear weapons. But the relationship of the actual research to our military functions, while conceivable, was not direct and apparent to technically knowledgeable members of the Air Force. Such work is being dropped.

In our review, 114 work units out of 1780 considered failed to show an adequately direct and apparent relationship to a specific military function or operation. The FY 70 funds associated with or planned for these work units total between \$3M and \$4M. This number is to be contrasted with a Congressional reduction of over \$10M from the FY 69 level. Every work unit that remains in our basic research program has been adjudged to meet the intent of

Section 203.

Let me add a note of caution. If the Congress deems it desirable to continue Section 203, I urge you to provide support for speculative research that is only vaguely related to military opportunities through agencies which the Congress deems more appropriate. I am uneasy about the vacuum we leave. I am also concerned that as the defense of research becomes more difficult we will become more conservative and will miss the creative, innovative ideas that can revolutionize our future as a nation. Had there been a Section 203 at that time, I don't believe the Signal Corps could have bought the Wright Brothers flying machine.

As another step to address your concern in the field of research, we have decided to integrate our Office of Aerospace Research into the Air Force Systems Command. We established the Office of Aerospace Research as a separate entity reporting directly into the Chief of Staff at a time when we needed to build high quality in-house labs to carry out essential research. Research needs protection from the pressing demands of today's problems, and the Office of Aerospace Research provided this protection and developed the top-quality labs we sought. Today the labs are healthy, and an organizational barrier is no longer deemed mandatory. Our research program can have a closer tie to the organizations with systems problems, and our future systems can benefit from the contributions of a more closely aligned research program.

Our research program has a great diversity because the Air Force must do many different things to carry out its mission. But while our research is comprehensive to our needs, it is not encyclopedic. We don't support broad research programs in genetics, in botany, in geriatrics, in oceanography, in automotive engineering, on highways, or in other areas which either have been assigned to some other agency or which have little direct and apparent mission application to the Air Force.

We do conduct research on the environment in which Air Force systems operate today and in the future. This includes the atmosphere, the ionosphere, and space.

This is where the Air Force must fly and fight, and where our sensitive, high performance systems have to operate under all conditions.

We do research on the earth itself, for we need to know how shock waves from

nuclear bursts affect missile silos buried in the earth.

We do research on the things we use. This includes research on light weight, high strength, high temperature materials. It includes research on electronics, structures, airframes, lubricants, control mechanisms, and engines. It includes research in chemistry, seeking new materials for solutions to new problems.

We carry out research on the way the things we use work. We carry out research on the physical processes that are involved in energy conversion and in

propulsion.

We carry on research on people—how a pilot performs in new environments and under new stresses, how to train airmen better and quicker; how to recruit,

assign, promote, rescue and rehabilitate our personnel.

We have been well served by the research which we have supported. We have today Over-the-Horizon radar detection systems which originated in research on electromagnetic wave propagation in the atmosphere. We have aircraft that fly at Mach 3, which were made possible only by research on materials, propulsion systems, and aerodynamics. We have space systems performing essential missions which were made possible by research on properties of the atmosphere and space, on materials, propulsion systems, and electronic systems. We have sensors in operation which see at night without being seen, which detect and track targets under all-weather conditions, which provide photography with unparalleled resolution. These sensors came from research in solid state physics, infrared radiation, electronics and radar, the atmosphere, materials, and information systems. These products may appear undramatic when compared with the atomic bomb, the transistor, and the laser, but they are absolutely essential to the functioning of a modern Air Force.

III. University Relationships

I would like to comment on the impact of changing developments on the university campus and how that has affected the Air Force. There are many extremely capable scientists and engineers who have chosen the academic career and will not leave that career. Fortunately for the United States, many of these men feel a sense of personal obligation to contribute to national security, and they have served the nation well. Some of our most creative work in such fields as electronic countermeasures, electronic intelligence, and nuclear weapons effects, as well as more basic work on materials, physics, chemistry, and mathematics, has been performed by them in our universities. Many of these men first got involved with the Department of Defense during World War II in such programs as the Manhattan Project and the Radiation Laboratory at MIT. Today they are middle aged, and we increasingly find that fewer and fewer of the outstanding young researchers are willing, much less eager, to work with the Department of Defense on matters of military importance. This worries us deeply, for the universities have been a source of expert and impartial advisors as well as excellent performers of needed research.

The trend began with attacks on classified research on campus; has now moved over to attacks on any DOD research on campus and, of course, on the ROTC and military recruiting, and if it continues could conceivably result in an almost

total separation between the academic world and the military world.

In considering our possible courses of action, it is essential to remember that the universities are not monolithic structures and that within the universities we have many long-time and valuable allies. It would be unwise for us to unilaterally decide to cut out our work at universities where controversy has arisen, for all we would then do would be to sacrifice our interests within those universities to the dissident students and faculty. Our first rule must be to protect those interests that are important to military security and to stay on those campuses where we are threatened so long as the advantages outweigh the dissident groups within a university force the cancellation of the ROTC program at that university, but we can still obtain research which we need at that university, I believe we should continue to do so.

TESTIMONY BEFORE HOUSE COMMITTEE

IV. FCRC MANAGEMENT

I should now like to turn to some of the issues that have been raised with respect to our Federal Contract Research Centers, and our management thereof. This year our request for RDT&E funds reflects a decrease of approximately 5% from last year's appropriation. This is in line with the overall RDT&E reductions which the Air Force is projecting. While each of the FCRCs has felt the impact, the reductions have not been uniform. The Air Force has established more stringent controls on self-initiated studies and analysis, and a closer identification with Air Force requirements has been achieved.

Last year, the Congress enacted legislation limiting the salaries of employees of the FORCs through Section 407 of Public Law 91-121. In the past, we judged compensation for executives of the FCRCs in comparison with that in the aerospace industry. We have taken the intent of Congress to be that compensation of members of the FCRCs should reflect more adequately the public service nature of the institutions. Accordingly, in our review, we considered compensation in such positions as university presidencies, laboratories of the Atomic Energy Commission, our own in-house laboratories, and other not-for-profit organizations. As a result of our review, we have recommended to the Secretary of Defense that exceptions be granted for salaries in excess of \$45,000 for only 8 individuals in Air Force FCRCs instead of the 17 in that category last year. The maximum salary recommended by the Air Force is \$70,000.

We have taken these actions in a determined effort to meet the concern of the Congress. I must emphasize to you the essential contributions which these FCRCs are making to Air Force RDT&E. Our need for their contribution continues.

V. VIETNAMIZATION

The last area I would like to address very briefly is the role that Air Force RDT&E is playing in the Vietnamization effort. Over the past several years, Air Force RDT&E has developed numerous new systems, techniques and weapons to enable our forces more effectively to prosecute the war in the complex environment of Southeast Asia. While many of these developments have involved modest modifications or adaptations of older equipment, many of the resulting equipments have been very sophisticated and required highly-skilled personnel in their employment. We are now reviewing the many weapons, sensors and techniques previously developed to improve the capabilities of our own forces in order to select those which can be effectively employed by the VNAF. In some cases, it will be necessary to make modifications in an effort to simplify U.S. equipment intended for transfer or to better accommodate to the particular needs of the VNAF. In addition, working in close coordination with DDR&E, we have been screening on-going research and development activities to identify those elements that might offer useful or unique capabilities to the VNAF. Night observation devices and pod-mounted reconnaissance equipment, which could be made adaptable to their aircraft, are typical examples of how on-going developments might be adapted for their use.

A major problem in accomplishing the Vietnamization of the war is that of training not only the skilled pilots but also the skilled technicians and maintenance men who must service the VNAF aircraft and weapons. The training techniques we have used in this country have generally presupposed a body of airmen who are high school graduates with good technical aptitudes. The airmen in the Vietnamese Air Force are not as familiar with the sophisticated equipment as is the average American recruit, and consequently the training problem is drastically different. The Air Force has developed a technique known as PIMO, which stands for Presentation of Information for Maintenance and Operation, for the flightline maintenance of the C-141 aircraft. This approach is something like that used in the instructions that accompany a do-it-yourself radio or television kit. PIMO uses a standardized language to minimize confusion, together with many photographs and simplified illustrations. The result was both to cut training time from 28 weeks to 4 weeks, and to improve effectiveness. Most important, it brought low-aptitude personnel up to the effectiveness level of highaptitude personnel for these special tasks.

With that, Mr. Chairman, I would like to conclude my prepared remarks. I shall be happy to address myself to your questions or, if you wish, we can delay discussion until the statements of General Glasser and General Ferguson have Digitized by GOOSIG been presented.

STATEMENT OF GENERAL GLASSER

Senator McIntyre. First of all let me say, Mr. Secretary, I enjoyed that statement. I am going to have to read your full statement pretty carefully. I think what it does, it meets some of the issues that are forming in this field of research and development, issues that are forming particularly as we go to the whole Senate, there to meet the amendments that are being offered and to present our case for the budget.

I am particularly interested in what you said about the universities, because in my recollection at the conference last year, the House Members offered some very strong language where the official act of a university or college caused the abandonment of ROTC programs, so I hope that you will present your case over there as to why you think even with a ROTC having been tossed out, that nevertheless where we can satisfactorily continue our relationship with the academic, that it be continued.

I think that we ought to hear General Glasser, and then as everyone has an opportunity to question, we can call on both of you, so we will hear from General Glasser now, please.

General GLASSER. Thank you, Mr. Chairman.

(The statement follows:)

Mr. Chairman and Members of the Committee:

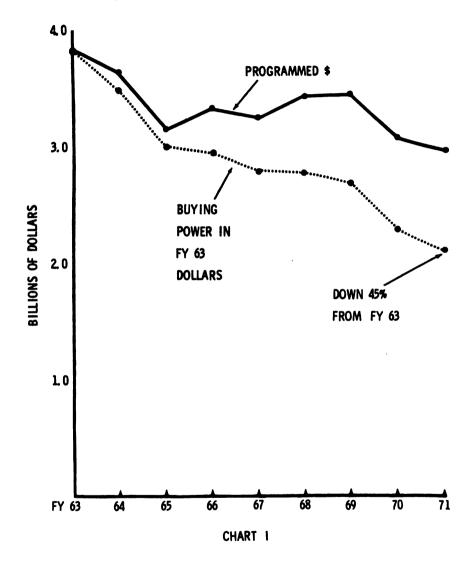
Today it is my privilege to present the Air Force Research, Development, Test and Evaluation program request for fiscal year 1971. In terms of actual dollars, this is the smallest RDT&E program request that has been submitted in the last decade. In terms of buying power, its limitations are even more severe. Chart 1 indicates the combined effects of program funding and inflation since 1963, the first year of our present accounting method. In terms of 1963 dollars, we are buying 45 per cent less RDT&E this year than we did during 1963.

While "austerity" may not sound like an appropriate word for a nearly \$3 billion program request, it is, nevertheless, in that spirit that the fiscal year 1971 RDT&E program was developed.

1078

USAF RDT&E PROGRAM FY 63 - 71

(EFFECT OF LOWER PROGRAM AND INFLATION)



FISCAL YEAR 1971 AIR FORCE RDT&E PROGRAM

This year, the Air Force Research and Development, Test and Evaluation program totals \$2,909.7 million. Of this amount, \$1,205.1 million is for major system development. The balance (\$1,704.6 million) will support our other system developments, technology efforts, and the operations of our laboratories and management elements.

By now, you have had an opportunity to examine how the major system development costs are distributed among different mission areas. This was provided to you earlier in the form of a DOD-wide summary, along with tables breaking out the distribution by individual service. The summary of Air Force major system development, shown in abbreviated format on Table I, will be familiar to you. I shall continue to refer to this summary and to selected parts of it throughout the major portion of my statement.

The central purpose of Air Force research and development activity is to provide timely and appropriate improvements in our forces. The need stems from current operational requirements and deficiencies either experienced or anticipated for the future. Hence, most of our research and development effort is related directly to particular mission areas and specific mission capability objectives. The remainder represents a constantly changing and growing technology base, from which future capability objectives may be met. Although not yet part of specific system development, the efforts in this category are nevertheless related to expected Air Force functions.

TABLE L-DEPARTMENT OF THE AIR FORCE FISCAL YEAR 1971 R.D.T. & E. BUDGET ESTIMATES-MAJOR SYSTEM DEVELOPMENT

l la	mill	ions	٥f	dol	bere	1
1 143	mill	IONS	oı	001	MITS.	1

	Fiscal year—		
	1969	1970	197
Strategic:			
Aircraft:			
FB-111 squadrons	62. 7	45, 4	16. 3
B-1 Subsonic cruise armed decoy (SCAD)	25. 0	100, 2	100, (
Subsonic cruise armed decoy (SCAD)	1.7	9.1	33. (
Conus air defense interceptor	Ō	2.5	2.
Missiles:	_		
SRAM	135.3	84.7	46. (
MINUTEMAN squadrons.	414.4	353.0	224
MINUTEMAN rebasing.	7.7.7	333.0	77.
Hard rock silo	23.0	25.0	,,. ,
Astronautics: Defense support program	95. 6	73.7	U
	9 3. 6	/3./	
Other:	20.0	40.0	
AWACS	39. 3	40.0	87.
Conus OTH radar	0	2.8	5. 3
OTH radar system	1.8	2. 8	3. (
Total strategic	798. 8	739. 2	
Tectical:			
Aircraft:			
A-7 aircraft	7.4	1.1	0
F-111 squadrons	99. 6	126.3	48.
RF-111 squadrons	6.0	2.0	70.
F-15	68.5	175. 1	370.
	00.5	2.0	
	U	2.0	27.9
Missiles:	40.0	40.0	
MAVERICK.	43.6	40.6	
Short range air-to-air msl (A IM-82)	2, 1	14. 0	37.
Total tactical	227. 2	361.1	
Other mission:			
Aircraft:			
	126.0	34. 2	11.0
C-5A	1.0	34. Z 0	2.
right intratives for transport	1.0	v	۷.
Total other	127. 0	34. 2	13.

Accordingly, I have chosen to discuss the major programs shown on Table I, as well as some of the other development efforts, in relation to their intended missions. Following this discussion, I shall summarize our fiscal year 1971 requests according to budget activity and make a brief comparison with our current program. Because of their critical national importance and your understandable,

intense interest in certain of our major system programs, we have arranged for the Commander, Air Force Systems Command, General Ferguson, and his Program Directors to discuss these programs with you in greater depth, later in the hearing. I would suggest, therefore, that detailed or penetrating examination of the MINUTEMAN, SRAM, F-111, C-5, AWACS, F-15 and MAVERICK programs be held for that occasion.

STRATEGIC OFFENSIVE CAPABILITIES

The primary operational mission of strategic offensive forces is nuclear retaliation—if necessary, even after absorbing a large-scale nuclear attack. To perform this mission, offensive systems must possess capabilities to: (1) survive an enemy first strike; (2) launch and fly in response to explicit command direction; (3) penetrate enemy defensive systems; and (4) destroy intended targets. Given our national policy to assure retaliation through maintaining different retaliatory systems, we strive to maintain these capabilities in both our bomber and missile forces.

In view of Soviet efforts to improve their defenses against manned aircraft and to proliferate their capabilities for intercontinental nuclear strikes, our future bomber capabilities must be improved over what they are today. Increasing numbers of Soviet ICBMs and warheads and their development of FOBS and SLBM systems give warning that our future bomber forces should be capable of dispersing to and operating from numerous airfields. Because minimum B-52 runway requirements limit the number of available dispersal sites, adequate dispersal capabilities can best be achieved with a new bomber. Increasingly sophisticated Soviet SAMs and interceptors and their newly deployed airborne warning and control system indicate that our future bombers must be able to employ a whole array of penetration devices and tactics to assure their reaching their targets. To achieve this objective, our B-52 force must be modified and equipped with new kinds of penetration aids. Moreover, as enemy defensive technology advances and as major elements of the B-52 force reach their utility limits, we will need a new bomber designed and equipped to maintain these oenetration capabilities.

Similar considerations affect our capability requirements for retaliatory missiles. Soviet deployment of hard-target kill missiles indicates that our future missile forces must be made more survivable than our current Minuteman I and II. Moreover, their missile force proliferation indicates that we need to develop means of retargeting our surviving missiles after determining the effects of an enemy first strike. Soviet exoatmospheric ABM capabilities warn that our reentry vehicles must be hardened against the effects of high altitude nuclear bursts. Finally, developments in ABM technology tell us that we may need to assure a capability to saturate enemy intercept systems with more decoys and warheads.

Our Research, Development, Test and Evaluation program for fiscal year 1971 includes several efforts dedicated to the assurance of our future retaliatory capabilities. In the manned aircraft category, the effort expected to have its first impact on our operational forces is our FB-111 program.

FB-111A

The FB-111A is being developed as an effective strategic bomber to replace some of our older B-52s. This aircraft will be the only modern bomber aircraft coming into the inventory for the next several years. With mid-air refueling, it will be able to fly almost 6,000 miles on its primary mission profile, which includes both high and low altitude flight. Its high dash speed, small radar return, and terrain-following radar for low altitude flight will give it substantial penetration capabilities against the enemy defenses.

Our planned procurement is now 76 aircraft. These are already in production and we estimate that SAC will have its first squadron of F-111s fully equipped and operational early in fiscal year 1971. Meanwhile, flight testing, data development and specialized testing of FB-111 peculiar equipment will continue into calendar year 1971. We are requesting \$16.3 million for the FB-111A this year.

B-1

The B-1, formerly the Advanced Manned Strategic Aircraft (AMSA), is needed as a replacement for the B-52 to maintain an effective bomber deterrent force in the late 1970's. With its wider dispersal and quicker reaction time and its advanced avionics, reduced radar cross section and higher penetration speed,

the B-1 will be able to survive both a missile attack and Soviet air defenses in sufficient numbers to be a credible retaliatory threat.

Since 1965, studies and advanced development efforts on the B-1 have evaluated a broad spectrum of performance characteristics for the aircraft, engine and avionics. For different enemy air defense environments, various mission profiles were studied with different combinations of penetration speeds and altitudes. Comparing costs and mission effectiveness, the combined high altitude supersonic, low altitude high subsonic speed capability was selected.

Our propulsion and avionics advanced development efforts have either met or exceeded our objectives. The propulsion system has been under development by two contractors. Their design fabrications of advanced propulsion concepts and tests of demonstration engines of the type and cycle envisioned for the B-1 have reduced the associated technical risks to a minimum. Studies to determine trade-offs between avionics packages are still continuing and will be completed prior to initiation of the B-1 engineering development contracts.

Requests for Proposals (RFP) for airframe and avionics were released to industry on 3 November 1969, and engineering development contracts using fiscal year 1970 funds are scheduled for award late this fiscal year. The propulsion system will be provided as Government Furnished Equipment to the B-1 systems contractor. The \$100.0 million in the fiscal year 1971 budget request is needed for these contracts.

Subsonic cruise armed decoy (SCAD)

To enable the B-52/B-1 bomber force to penetrate improved enemy area defenses expected by the mid-to-late 1970's, we will need a decoy with vastly greater capability and credibility than our present Quail. Therefore, we are developing the Subsonic Cruise Armed Decoy (SCAD).

Due to the urgent requirement for an early initial operational capability (IOC) and concern for minimizing technical risks within austere funding constraints, two time-phased versions of SCAD are planned. SCAD A is being developed primarily as decoy for the subsonic B-52, but designed with an option to be armed with a nuclear warhead. SCAD B will be a longer range decoy specifically designed for use with the B-1 and also having the option for nuclear armament. The armed SCAD may be used to attack area defenses such as airfields, radar sites or control centers.

SCAD is now in concept formulation. In-house and contractor studies have been completed on the preliminary SCAD A design. Engine and decoy electronic studies are continuing, and our aim is to produce a flyable, feasibility model of a multi-band electronics payload and a SCAD A antenna mock-up.

We are requesting \$33.6 million in fiscal year 1971 to continue SCAD A development and efforts on decoy electronics and propulsion.

Short range attack missile (SRAM)

A totally different kind of weapon system is provided by the Short Range Attack Missile, or SRAM. Its purpose is to enhance the capability of the B-52, FB-111 and B-1 to attack terminally defended targets. With the Soviets deploying numerous surface-to-air missiles (SAMs) of improved effectiveness against low flying as well as high flying targets, the use of ECM and very low altitude penetration alone will no longer afford adequate means for reaching assigned targets. The SRAM is needed to attack the target directly while the bomber remains outside effective terminal defense range and to destroy terminal defenses prior to bomber penetration of the target area.

Past development problems, primarily with the motor, have delayed completion of the development by 26 months. Solutions for the technical problems have now been developed and flight testing has been resumed. The \$46.0 million RDT&E funds requested for fiscal year 1971 are needed to complete the series, the final test being scheduled for the near future. We expect that the SRAM development contract will be completed in September 1971.

MINUTEMAN II & III

The MINUTEMAN IOBM force now consists of 500 MINUTEMAN I and 500 MINUTEMAN II missiles, the last of which were deployed in June 1969. MINUTEMAN III is scheduled for initial deployment in the near future and will incrementally replace the MINUTEMAN I missiles in the force. The MINUTEMAN III will be more accurate than previous ICBMs as a result of mimproved guidance and control system. Its improved third stage and post-boost propulsion system will provide the capability to carry multiple MK-12 re-entry vehicles

together with related penetration aids. This MIRV system will enhance the effectiveness of our missile forces.

We are requesting a total of \$224.2 million for MINUTEMAN squadrons in fiscal year 1971. Of this amount, \$38.8 million is needed to continue such effort as general support and to perform further in-place and in-flight hardness testing on the MINUTEMAN II. Funds in the amount of \$185.4 million are needed for systems integration and testing, guidance and control support, post-boost propulsion system testing and in-place and in-flight hardness testing for the MINUTEMAN III.

MINUTEMAN rebasing

The sensitivity of fixed site missile vulnerability to improving Soviet ICBM accuracy has given us concern regarding the pre-launch survivability of the MINUTEMAN force. A new program element has been established to consolidate and better focus our development efforts on this problem.

Our efforts to date have included evaluations of the following possibilities: (1) hardening the MINUTEMAN sites; (2) providing a close-in hard point defense of the silos; (3) reducing Hard Rock Silo costs; and (4) providing mobility for part of the force through wheeled or air cushion vehicles and deceptive shelters. For fiscal year 1971 we are requesting \$77.0 million to continue these studies, to increase the survivability of the MINUTEMAN command and control system and to initiate development efforts to reduce the vulnerability of our fixed missile sites. In addition, we plan to complete presently scheduled calendar year 1970 Hard Rock Silo engineering efforts to insure against unknowns and to provide an orderly basis for possibly proceeding with future new silos.

Command data buffer

In fiscal year 1969, we began a development effort (MICCS) designed to improve the command and control of the MINUTEMAN force. Our efforts included preliminary design and development of a system to allow retargeting of the MINUTEMAN force through generating target constants at the launch control facility.

In fiscal year 1971, under the Command Data Buffer program, we plan to continue developments that will allow us to more rapidly retarget our missiles. We are requesting \$10.0 million for this purpose.

Advanced ICBM technology

As their operating environments change, we must continually work on technology designed to preserve the retaliatory capability of the programed ICBM forces and to support the possible future development of a new ICBM.

Major emphasis within this program is concentrated on advanced guidance and post-boost vehicle technology. The advanced guidance work is directed toward improving system survivability and increasing accuracy. We are conducting tests to verify nuclear hardening techniques for inertial guidance systems and tests of continuous calibration and self-alignment techniques. Our post-boost vehicle effort includes analysis of nuclear hardening requirements and techniques and examination of solid propulsion systems. We will continue this work with fiscal year 1971 funds.

Advanced ballistic re-entry systems (ABRES)

As executive agent for the Department of Defense, we also manage an advanced development program to provide improved re-entry systems and penetration aids for all U.S. strategic ballistic missile programs.

Some of the techniques being investigated include masking re-entry vehicles with chaff, decoys and electronic and optical countermeasures. Others include hardening of re-entry vehicles to survive in a defended environment and new fuzing concepts to optimize weapon effects for a selected target. The program also provides technological support for current re-entry system engineering developments such as the MK-12 system for MINUTEMAN III and the MK-3 for the Navy's POSEIDON, and for operational re-entry systems such as the MK-11 system for MINUTEMAN II.

As the executive agent for this Department of Defense program, we are requesting \$105.0 million for fiscal year 1971 to continue this development and to test advanced re-entry systems and technology for all the services. We plan four large payload test flights using the excess ATLAS E and F launch vehicles and eight small payload flights using the ATHENA launch vehicle.

STRATEGIC DEFENSIVE CAPARILITIES

The primary function of strategic defensive systems is to strengthen deterrence. By presenting a clear capability to detect and disrupt the pattern of a nuclear strike, defensive systems increase the enemy's risk that even his best planned strike may not prevent our effective retaliation. Their secondary function, should deterrence break down, would be to limit damage to the United States. These functions apply to both our missile defense systems and our bomber defense systems.

Assuming that nuclear war would begin with an attempted enemy strike and knowing that its effectiveness would be heavily sensitive to the degree of surprise achieved, we can see our capability needs rather clearly. First, we need to have early and unequivocal warning of attacks from missiles and orbiting vehicles. We need means of tracking and intercepting hostile missiles in flight. Accordingly, we are now investigating concepts and technology complementary to Safeguard

system development for a missile defense in depth.

Enemy bombers are also a threat. We have evidence which indicates that the Soviet Union has a prototype of a new medium range aircraft. In addition, some of their long range bombers have been equipped with air-to-surface missiles (ASMs) that can be launched at considerable distances from their targets. In fact, the Soviet bomber force is capable of several credible attack options. Moreover, our defenses are vulnerable to missile attack and would be of limited effectiveness in the event of a combined missile/bomber strike. We need to increase the range and coverage of our warning systems to provide adequate time for alerting and deploying our forces. We need survivable airborne surveillance and control systems that can detect and track aircraft flying at all altitudes and direct weapons to intercept these aircraft; and we need interceptors with the range and speed to kill bombers beyond their ASM range and with fire control/missile systems that have a "look down, shoot down" capability.

Missile and space defense

The nation's most serious defensive deficiency is our vulnerability to missile attack. Accordingly, we are investigating several concepts and related technologies for defense against future missile and space threats.

We are requesting \$5.0 million in fiscal year 1971 to continue our studies of an Advanced Missile and Space Defense system and supporting technology.

Midcourse surveillance system

The Air Force has long believed that security from enemy missile attack requires a defense in depth that would enable early detection, tracking and discrimination of ICBMs, SLBMs and FOBs from boost throughout the midcourse and re-entry phases. Problems encountered in attempting to achieve midcourse discrimination have limited technical progress to date.

We have initiated an advanced development program to apply new technology to the midcourse tracking and discrimination problem. A system employing satellite based sensors looks promising, but we are investigating several alternate sensor/platform combinations to assure that no promising concept is overlooked.

In addition to being a prerequisite for achieving a defense in depth, the data provided by this system would be invaluable for monitoring limitations on weapons development and deployment that could result from the Strategic Arms Limitation Talks (SALT). We are requesting \$2.0 million to continue the conceptual studies and preliminary design work for this system.

Advanced sensor technology

The Advanced Sensor Technology program was initiated in fiscal year 1970 to investigate the potential of various sensors for future surveillance and defensive systems. These sensors could be used in such system developments as the Midcourse Surveillance System and Missile and Space Defense. The program will also develop optical instrumentation capable of evaluating the performance of penetration aids for offensive systems. To proceed, it is necessary that we first determine by an extensive measurement program the actual target signatures from re-entry vehicles and associated penetration aids, as well as the backgrounds which provide interference.

The \$7.6 million in our fiscal year 1971 program request will be used to begin measurement with sensors aboard satellites launched by our Space Experiments Support Program (SESP). Development will also begin on the instrumentation for suborbital flights aboard Atlas boosters to evaluate penetration aids developed under our Advanced Ballistic Re-entry Systems (ABRES) program.

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Airborne warning and control system (AWACS)

One of the deficiencies in recent bomber defense technology has been our limited capability to detect and track aircraft operating at low altitude over land. The distinguishing feature of the Airborne Warning and Control System (AWACS) program is its ability to remedy this. The AWACS program will combine long range radar coverage for both high and low altitudes with associated command, control and communication functions in a large jet aircraft. It will provide a capability to perform both the continental U.S. air defense and overseas tactical missions. When combined with an improved interceptor, the air defense AWACS will provide a survivable capability to engage attacking bombers hundreds of miles from our borders before these bombers reach the launch points for their air-to-surface, stand-off missiles.

We are requesting \$87 million in the fiscal year 1971 program to initiate systems engineering of an austere version of AWACS. Prior to committing large sums of money for production, we plan to demonstrate with a prototype system that the AWACS mission can be successfully accomplished. This effort will consist of installing and flight testing the candidate radars and associated equipment in what we call radar brassboard testbed aircraft. With our planned schedule, an operational AWACS can be available in the mid-1970's.

CONUS OTH backscatter radar

We are also making excellent progress in developing the Over-the-Horizon Backscatter (OTHB) radar for use in defense of the Continental United States (CONUS). Our current program is to deploy OTHB radars so they will have the capability to detect approaching bombers anywhere within their surveillance arcs out to significant ranges.

Our fiscal year 1971 program request includes \$5.3 million to complete contract definition and to begin development leading to an initial operational capability in 1975.

CONUS air defense interceptor

An improved manned interceptor with the capability to detect and destroy low altitude enemy bombers is essential to improving our nation's air defenses. Since the fire control and missile system is the longest lead time item in developing an improved interceptor, we are using funds available in fiscal year 1970 to initiate the design and system engineering of an improved fire control/missile system. We will take advantage of technology and expertise derived from our earlier F-12 fire control and missile system work, the Navy's Phoenix System, and the radar systems now being developed for the F-15.

As you know, we have experienced difficulty obtaining approval for an interceptor that will provide the necessary performance at an acceptable cost. An in-depth analysis considering all the likely aircraft candidates has been conducted to determine the optimum interceptor airframe to carry the improved fire control and missile system. We will soon complete our selection.

We are requesting \$2.5 million in 1971 to continue system engineering of the improved fire control/missile system mentioned earlier so that we may design and fit the system to the selected airframe. If the airframe is approved in the near future and sufficient funds are provided, an improved interceptor could achieve an initial operational capability by the mid-1970's.

TACTICAL AIR CAPABILITIES

U.S. tactical air forces exist primarily to assist in the defense of areas where our Government perceives vital national security interests and to support tactical operations mounted in the course of that defense. Operationally, this will usually require that tactical air forces perform one or more of their classical missions: (1) counter-air, including combat zone air defense; (2) close air support; (3) interdiction; (4) tactical air reconnaissance; and (5) tactical airlift.

To perform these missions, tactical air forces must possess equipment with a variety of capabilities. We need forces capable of deploying on short notice to forward combat areas in Europe and Asia, and of being ready to fight on arrival. We need to be able to detect and identify approaching aircraft and to control the intruder intercepts and other combat sorties in these forward areas. We need aircraft capable of winning air-to-air encounters with the most advanced enemy fighters. We need aircraft, weaponry and communications capable of providing timely fire support to engaged ground forces and against enemy

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equipment and emplacements. We need the capability to penetrate expected enemy air defenses, to acquire fixed and moving targets, and to attack such targets when the battlefield situation requires that they be struck. Finally, we need to provide aerial surveillance of the battle area and of enemy rear-area communication routes and resource concentrations, along with means for communicating observations to appropriate command authorities.

AWACS (tactical)

The potential value of an integrated airborne warning and control system to tactical air operations has long been recognized. More recently, air operations in Southeast Asia have emphasized the critical need for an airborne surveillance, command, control and communications capability to extend the range and increase the capacity of our ground-based Tactical Air Control System (TACS). Until radar was developed to detect and track aircraft at low altitudes over land, however, this capability was restricted by technical limitations. Now, the new AWACS radar will enable us to monitor enemy air activity and provide surveillance and control for our tactical aircraft at ranges far beyond the current capability of the TACS.

With a variety of sensors for surveillance, its data processing and display equipment, its extended communications capability, and with delegated decision authority on-board, the AWACS is uniquely capable of serving as a tactical force control center. AWACS will provide positive control of strike aircraft, reduce aircraft losses, increase kills of enemy aircraft, and reduce missions aborted through premature release of weapons due to the threat of enemy air attack.

F-111 D/F

Penetration of heavily defended areas and effective attack of targets at night and in adverse weather have long posed operational problems for tactical air forces. We now have an aircraft designed specifically for these difficult but important tasks. In the air interdiction role, its penetration and all-weather capabilities plus its capacity for conducting attack missions from distant bases make the F-111 D or F far superior to any other aircraft in our inventory. Additionally, the F-111 will have the armament and fuel capacity to perform armed reconnaissance missions over a wide area.

Although we are pleased with the technical excellence of the Mark II avionics system on the F-111D, cost increase have led us to limit its installation. Accordingly, we have developed a more austere avionics system consisting of components of the Mark IIB (FB-111 system) and of the Mark (F-111 A/E system) for use in the later production fighters the F-111Fs. This system will be comparable in performance to the Mark II (F-111D) except in its capability for acquiring moving targets.

As you know, we have also had some structural problems during F-111 development. Solutions for these are now in hand, as will be described in detail by General

Flight testing by the contractor and the Air Force will continue this year and through fiscal year 1971. The first F-111F with the new P-100 engine and the new austere avionics package is scheduled for its initial flight in the near future. This will lead to a squadron IOC shortly thereafter. We are requesting \$48.2 million for the F-111 RDT&E program, of which \$18.8 million is to complete development of the P-100 engine.

F-15

Combined plans for the defense of treaty areas incorporate a strong role for friendly aircraft flying ground attack and interdiction missions in support of local ground defense operations. If enemy fighter aircraft were to limit this activity, our defensive effectiveness would be seriously eroded. During the early 1970's, Warsaw Pact tactical air forces are expected to include some of the highly maneuverable, high performance aircraft now being flown by the Soviet Union as prototypes. The F-15 will provide the means to counter this sophisticated air-to-air threat and permit effective defense against aggression in other areas to which Soviet fighters may be exported.

During the past four years, we have made excellent progress in the development of suitable engines and radars for the F-15. Prototype engines have been running on test stands as a result of our joint Advanced Technology Engine project with Navy. In late February, we awarded a contract to Pratt and Whitney for this

development program. Prototype radars will be flight tested, with engineering contract selection scheduled for October following the fly-off competition.

During fiscal year 1971, we plan to continue with detailed design efforts, and with wind tunnel, material structural and subsystem development testing. We also plan the release of long lead-time items to subcontractors. We are asking for \$370.0 million for these purposes.

A-X

Every modern war has reconfirmed the value of aircraft as mobile platforms for timely delivery of accurate firepower in close air support of engaged ground troops. The A-X is specifically designed for this mission. It will have the characteristics of short response time, lethality, survivability and simplicity required by the Army and Air Force for effective close air support.

The Short Takeoff and Landing (STOL) capability of the A-X will permit use of short battlefield area airstrips and its large fuel capacity will give it long loiter time, thus making the aircraft highly responsive to the needs of field commanders. The A-X will be capable of delivering a large ordnance load and employing a large caliber, high rate-of-fire gun system against ground targets. Its survivability in the battlefield environment will be enhanced over present systems through use of armor around the cockpit and critical components, signature suppression, dual manual flight controls, twin engines, redundant structure, and self-sealing, foam filled fuel tanks. The simplicity designed into the A-X will allow it to be maintained and operated from austere bases.

Studies directed by OSD last year have been submitted along with our proposal to initiate engineering development late in fiscal year 1970. We plan a competitive prototype development, in which two contractors will each build two aircraft. A competitive fly-off test program will determine which contractor will be awarded the contract for final A-X development and production. We are requesting \$27.9 million to continue development of these prototype aircraft in fiscal year 1971.

F-4 Avionics

The SA-2 surface-to-air missile threat to our forces flying over North Vietnam motivated development efforts to counter this and other radar controlled defensive systems. The F-105 Wild Weasel detection and attack system was one of several methods employed in this countermeasures role. Therefore, we are developing a new system, tailored for the F-4D, and capable of vastly improved performance.

Earlier studies funded under the Aircraft Equipment Development line item defined the program, identified the necessary technical developments and performed some component development and testing. In fiscal year 1971, we plan to continue development of prototype systems, complete the necessary qualification, reliability and integration testing, and install the system on an F-4D aircraft.

Aircraft Equipment Development

Improvements in enemy capability can sometimes be countered simply by changes to the subsystems and equipment installed on existing aircraft. In our Aircraft Equipment Development program, we develop, test and evaluate a wide variety of subsystems and equipments, drawing heavily on the results of our exploratory and advanced programs in avionics, propulsion, flight dynamics and materials. Examples of this work include the development and testing of the digital computer fire control systems and night attack equipment for the AC-130 Gunship and the sensor controlled swiveling gun for night interdiction. Also, work was initiated on the night rescue version of the HH-53 helicopter in this program.

We are requesting \$11.9 million in the fiscal year 1971 program to continue work on such items as a radar correlation bombing system, sensors for target detection, advanced cockpit instrumentation and an advanced laser/seeker designator. In addition to these developments, we are also investigating such items as palletized guns for converting transport aircraft to gunships.

Advanced Aerial Target Technology

To be reliable for combat situations, weaponry must be tested under operational conditions and on realistic targets. Accordingly, we have initiated a new program to develop advanced aerial targets and ancillary equipments for air-to-air and surface-to-air missile tests.

The primary project in our Advanced Aerial Target program is the High Altitude Supersonic Target (HAST). This new vehicle will provide all three services with a low cost target capable of operating at speeds varying from subsonic to over Mach 3 and at altitudes ranging up to 100,000 feet. Supporting tasks include development of Advanced Radar and IR Augmentation, which will more realistically simulate the radar cross sections and IR signatures of threat aircraft. Unrealistic simulation has been a continuing problem in using small target drones. We have also had a problem in measuring how close our missiles come to the target drones in the event there is no direct hit. The Vector Miss Distance Scorer will solve this problem and aid us in evaluating the probability of kill of our missiles and in determining the correct warhead fuzing.

MAVERICK

Presently available air-to-ground weapons are not suitable for successfully attacking small, hard targets like tanks, armored personnel carriers and fortified positions. Unlike these other weapons, the MAVERICK is designed to couple much greater accuracy with a warhead specifically engineered for penetration. As a consequence, it will complement our other missiles and bombs, which are optimum for use against larger, softer targets.

The MAVERICK's electro-optical guidance system automatically directs it to its target without further reference from the launching aircraft. This enables the pilot to immediately seek out other targets, thus increasing the effectiveness of the weapon system on a single attack. It also permits him to perform evasive or protective maneuvers if attacking a well defended area. Both pilot and aircraft are much more vulnerable when it is necessary to track a missile until it actually impacts on the target.

MAVERICK's first guided test flight last year was a success: It did lethal damage to a tank from a significant range. Further contractor testing of this nature is scheduled for completion in fiscal year 1971.

During fiscal year 1971, we also plan to begin Air Force Category II weapon system testing. Missile performance under a variety of launch speeds and altitudes as well as the effects of the operational environment, to include varying conditions of light, shade and background, will be tested during this phase.

Short Range Air-to-Air Missile (AIM-82A)

The statistics of air-to-air combat in Southeast Asia reveal a deficiency in our missile capability at short range. Accordingly, the Air Force is developing a short range missile for use in the rapidly maneuvering "dogfight" role. This new missile, the Short Range Air-to-Air Missile (AIM-82A), will have

This new missile, the Short Range Air-to-Air Missile (AIM-82A), will have a markedly improved capability in comparison with currently available air-to-air weapons. Present day infrared missiles are limited to tail attacks, and our radar guided missiles require that attacking aircraft maintain the target within the view of the aircraft's radar. By contrast, the AIM-82A is designed to acquire and lock-on a maneuvering target from any aspect angle and to proceed to its target while the attacking aircraft turns away.

The AIM-82A missile will be developed in parallel with the F-15 aircraft and optimized to operate along with it. However, the missile will also be made compatible with other fighter aircraft such as the F-14, F-4, A-6, A-7 and F-111. The F-15/AIM-82 Interface Analysis was completed in July 1969 and it is anticipated that Contract Definition will be initiated later this year. We are asking for \$37.2 million in fiscal year 1971 so that development of the AIM-82 missile may commence.

Improved Aircraft Gun System

New guns and improved ammunition continue to be needed as essential parts of our aircraft armament systems. Our program includes development of a family of improved 20mm rounds for existing guns to achieve greater capability against lightly armored vehicles and personnel carriers. In addition, two completely new guns are in development: one for aerial combat and the other for close air support.

The aerial combat weapon is a caseless round gun system being developed for the F-15 air superiority fighter. Increased muzzle velocity, range and projectile weight will lead to increased effectiveness against high performance aircraft. Current plans are to have two contractors continue competitive development for approximately 18 months, to include a competitive "shoot-off" prior to selecting the contractor for final development and production of the operational system.

The close air support gun will be a system with increased capability against ground targets such as tanks, armored personnel carriers, trucks, and radar stations. Two contractors will be selected to participate in a parallel engineering development program. At its conclusion, competitive tests will narrow the field to a single contractor for completion of the development and production of operational hardware.

We are asking for a total of \$20.9 million during fiscal year 1971 for this program.

Truck interdiction

During the intensified interdiction campaign of 1969, we determined that although we attacked and actually observed hits on a large number of vehicles, relatively few were destroyed. Although this limited truck-killing success cannot be blamed entirely on munitions, we feel that improvements to our present anti-vehicular devices and identification of optimum munition combinations will improve our performance.

The immediate program goal is to provide our operational forces with improved munitions. We have canvassed industry for proposals and have awarded four small contracts to provide a number of devices for a competitive "shoot-off," leading to engineering development. We plan to address longer-term solutions to the problem of vehicle destruction after we accomplish this immediate goal. We are requesting \$10.0 million to continue our truck interdiction development efforts in fiscal year 1971.

Conventional weapons

Our new weapons are developed under three closely related R&D programs: Conventional Munitions, Conventional Weapons, and Armament/Ordnance Development. Conventional Munitions is our exploratory development program in which we seek new weapons concepts and techniques, conduct studies to identify future weapon applications, and select the most promising items for continued development. Conventional weapons is the follow-on advanced development program, wherein promising weapons concepts are translated into prototype hardware for feasibility and effectiveness testing. Candidate concepts found acceptable by ground and flight tests are then forwarded for further development in the Armament/Ordnance Development program. Here, engineering development of the most promising weapons is completed, designs are finalized and necessary testing performed.

One of the more significant accomplishments through these programs has been the development of laser and electro-optical guided bombs. These bombs have a very small CEP, as compared with free fall weapons. In Southeast Asia, our 750, 2000, and 3000 pound bombs equipped with these guidance packages have been particularly effective against bridges, interdiction points and other pinpoint targets. Other weapons systems that have been introduced as a result of these programs are 7.62 mm and 20 mm gun pods, anti-personnel and antimateriel dispenser munitions, firebombs, improved fuzes and retarders for our 750 pound bombs.

We are requesting \$27.5 million for all three programs in fiscal year 1971. With these funds, we plan to continue our work in improved gun propellants, a hard structure munition, fuel-air explosive weapons, low-cost optical fuzing and large cratering devices. We will also investigate a modular weapons concept, permitting interchanges among the warheads, guidance packages and other parts of the weapon and adaptation of our weapons to meet the demands of particular targets.

AIRLIFT CAPABILITIES

As long as the United States retains mutual defense treaty agreements with governments in Europe, Asia and Latin America, our airlift forces may be called upon to deploy our military forces to these regions and, together with sealift, support both our forward deployed forces and those of our allies. The strategic airlift mission of rapidly deploying units (personnel with materiel) overseas is one for which we will have acquired considerable capability. It will be performed primarily by the C-141 and newly developed C-5A, augmented by designated commercial aircraft, called the Civil Reserve Air Fleet (CRAF).

Tactical airlift interfaces with strategic airlift and sealift to provide theater commanders with rapid delivery, increased mobility and logistic support in areas with limited surface lines-of-communication. Our capabilities for this kind of airlift are badly in need of improvement.

The tactical airlift force, consisting largely of aircraft over ten years old, is aging at an accelerated rate due to wartime use rates. To modernize this force, we will need rugged and easily maintainable transport aircraft with sufficient performance characteristics and survivability for efficient operation from crude and very short airfields close to the battlefield. We will also need on-board, self-contained devices for rapid loading and unloading in unprepared areas.

C-5A

By providing a capability to deploy the Army's outsize equipment by air, the C-5A heavy logistics transport will solve what has been until now a major air-lift problem. Because of its high flotation landing gear and great capacity, it will also be able to airlift large quantities of smaller combat equipment and support personnel into forward deployment areas. This aircraft is the product of a development and procurement program that began in October 1965 and will extend into 1972.

The RDT&E phase of the program nears completion. We anticipate that contractor and Air Force flight testing will be completed early in fiscal year 1971 and that Category III Operational Suitability Testing will begin sometime during calendar year 1970. Major static structural testing is scheduled for conclusion this summer, and we plan to finish flight test demonstration of 100 per cent structural integrity in July 1971. The wing cracks discovered in January and February of this year appear to be a design problem. The contractor is now installing structural reinforcement in the location of these cracks, and tests are underway to insure that this will solve the problem.

We are asking for \$11.6 million in order to complete this R&D program.

Light Intratheater Transport

Our tactical airlift mission is presently being accomplished by C-130, C-123, and C-7 aircraft. We expect reliable service from the C-130 for a number of years, but it can handle only a portion of the tactical airlift tasks. It is restricted to conventional take-off and landing operations from moderate length runways. At present, our short field capability is provided by the C-123s and C-7s, which are limited in numbers, cargo comparent size and payload capacity. Our studies indicate that a new aircraft, the Light Intratheater Transport (LIT), is one of the stronger candidates to replace these older systems.

Either a V/STOL or STOL system provides a viable alternative to achieve tactical airlift modernization. We are deferring the decision as to which alternative will be selected. In fiscal year 1971, we plan to continue and expand our work on promising V/STOL and STOL technologies, to initiate flight control investigations, and to continue our study of alternatives for the tactical airlift mission. Our program request contains \$2.0 million to contribute to these purposes.

VTOL engine development

For some time we have recognized the inherent advantages of aircraft with a vertical lift capability. Therefore, to increase the knowledge needed for development of an effective VTOL capability, we are pursuing technology efforts in three main areas: direct lift engines, propellers, and exploitation of foreign equipment.

The direct lift engine effort is being conducted jointly with the United Kingdom, and is currently in the engine test phase. We are close to achieving our technology goal, and by mutual agreement with the U.K., we will complete the direct lift engine effort during fiscal year 1971.

Some VTOL utilizations, such as the Light Intratheater Transport and Advanced Rescue and Recovery System, will require a minimum amount of propulsion downwash. Therefore, we are investigating the technology of large diameter propellers—particularly the blade design, the gear box design and the use of new materials. Eventually, we plan to test a large scale propeller with cyclic pitch control. We are requesting \$5.0 million to continue our propeller and exploitation efforts in fiscal year 1971.

TECHNOLOGY BASE

Thus far, Mr. Chairman, I have dealt only with development programs pertaining to the systems that we believe necessary to meet future threats.

These are the end products of technology programs which at their origin were based on what we then thought would be needed for system development "today." To provide the base for the next generation of systems, I would like now to discuss some of the technologies that we believe will be needed "tomorrow."

Most of our technology results from our exploratory and advanced development programs. It is these development categories that provide the know-how and the techniques which prepare us to meet the needs of the next decade. For this reason, we are concerned that this important but less glamorous effort not be reduced to a level that could mortgage our future capabilities. Of course, trade-offs have to be made between what we invest in the future and what we devote to current weapon system development, and we continually review and evaluate our technology programs to eliminate efforts with low priority. At the same time we try to insure that we are pursuing those technology areas that are most essential to our future security.

The technology efforts closest to application in systems engineering are found in our advanced development programs. Several of the programs I have already discussed are in this category. While many of our other advanced development programs are equally applicable to specific system development, most are useful in more than one system. I will discuss a few of these to illustrate their role in the time-phased, building-block approach to weapon systems

development.

The Advanced Turbine Engine Gas Generator (ATEGG) and Aircraft Propulsion Subsystem Integration (APSI) programs have fed directly into several system development efforts. In the ATEGG program, we design, fabricate and test gas generator cores using the latest component technology. These are not complete engines but long lead-time parts consisting of the compressor, combustor and turbine. We test only enough to prove that the core design can be used in a new propulsion system designed for a specific purpose. The B-1 demonstrator engine and the F-15 initial engine development are direct derivatives of this program.

Similarly, we have found that engines designed independently of airframes may have devastating results on overall weapon system performance. The Aircraft Propulsion Subsystem Integration (APSI) program is designed to provide the technical capability to integrate the engine with the airframe and obtain optimum performance from the total system. We are applying this technology to the F-15 development by providing data on completed engine inlet tests to the F-15 contractors.

Another advanced development that has direct application to aircraft systems development is the Flight Vehicle Subsystem program. Since a major cause of aircraft losses to enemy ground fire has been damage to the flight control systems, we are developing a Survivable Flight Control System. This system is an all electric, quadrupally redundant system potentially usable in the B-1

program.

Our Advanced Avionics program seeks to improve our ability to hit small targets under all conditions of visibility. The primary effort is devoted to development of sensors with their cockpit displays and to integration of these devices with other aircraft subsystems into a complete fire control weapon delivery system. The high payoff of this advanced development effort is illustrated by the forward looking infrared sensor and low light level TV now in use on aircraft in Southeast Asia. Current effort includes an electronically scanned, phased array radar antenna for strike aircraft and completion of an all-weather close support weapon delivery system.

One final advanced development I would like to mention is the Advanced Space Guidance program. The objective of this program is to develop and demonstrate an instrument which can indicate the precise pointing direction of various spaceborne sensors and communications antennas. Applications for this device include reducing ICBM target location uncertainties, improving space object surveillance and tracking, aiding precise navigation techniques and im-

proving satellite inspection.

We turn now to exploratory development. As previously discussed in relation to conventional munitions, there is a close supporting relationship between exploratory work and more advanced development in most program areas. Six technology programs which provide a base for most of our advanced and engineering development efforts are shown in Table II. Shown also are the Air Force Systems Command (AFSC) facilities responsible for program management and the amount of money requested in the fiscal year 1971 program. It should be noted that these sums include funds for the operation and management of the respective laboratories, including civilian salaries. I will discuss each of these programs briefly, and General Gilbert, who is the AFSC Director of Laboratories, will assist me in responding to your questions.

TABLE II.—DEPARTMENT OF THE AIR FORCE FISCAL YEAR 1971 R.D.T. & E. BUDGET ESTIMATES—TECHNICAL FIELDS OF EXPLORATORY DEVELOPMENT

In millions of dollars)

Technical field	Management agency	Fiscal year 1971 funds ¹
Flight dynamics	Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio	31. 0
Aerospace propulsion	Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio	31. 0 27. 0
Avionics	Avionics Laboratory, Wright-Patterson AFB, Ohio	44. 0 25. 0
Rocket propulsion	Rocket Propulsion Laboratory, Edwards AFB, Calif	25. 0
Weapons and applications	AF Weapons Laboratory Kirtland AFB, N. Mex	8. 0
Ground electronics	Rome Air Development Center Griffiss AFB, N.Y	35, 5

¹ These funds include laboratory operating costs.

In Flight Dynamics we are doing work in the five technical areas that will provide the technology for future aerospace vehicles: aircraft structures, flight controls, flight mechanics, dynamics and equipment. Representative of our work in this field are our efforts to reduce the weight and vulnerability of aircraft structures and to improve flight control and aerodynamic performance at transonic speeds. The components and technical data produced by this exploratory effort are used to produce subsystems and design data for advanced aircraft systems, including the F-15 and B-1.

Our Aerospace Propulsion program provides for technological advances in five functional areas: turbine propulsion, ramjet propulsion, electric power, electric propulsion, and fuels and lubricants. The individual components produced by this program are integrated into advanced propulsion systems and then into airframes for testing under two advanced development programs I mentioned earlier: Advance Turbine Engine Gas Generator and Aircraft Propulsion Subsystems Integration.

Avionics is one of our most important exploratory development programs. It advances technology in the areas of navigation and guidance, weapon delivery and fire control, aerospace surveillance, communications and electronic countermeasures. Most of the avionic systems employed in such weapon systems as the MINUTEMAN, F-111 and RF-4 are outgrowths of projects in this program.

The Rocket Propulsion program provides the technology needed in both solid and liquid propellant rocket engines for new ballistic missiles, tactical missiles and space propulsion systems. We are concentrating our efforts on the design and operation of such items as thrust vector control, high energy propellants and advanced cooled combustion chamber and nozzle concepts. The fundamental technology which made possible the development of propulsion systems for our ATLAS, TITAN, MINUTEMAN, FALCON and SATURN was provided by this program.

Our work in the Advanced Weapons and Applications Technology program is closely coordinated with organizations such as the Atomic Energy Commission (AEC) and the Defense Atomic Support Agency (DASA) to develop concepts and equipment for the employment of advanced weapons. Our recent efforts on nuclear warhead design criteria for the Subsonic Cruise Armed Decoy (SCAD) and radar and infrared optical fuzing for hypersonic re-entry vehicles are representative of our many activities in this program.

The Ground Electronics program advances technology over a wide range of activities for application in the areas of surveillance, intelligence collection, data processing and display, and command, control and communications. Examples of systems and equipments that are based on this program's efforts are the over-the-horizon (OTH) radar, high power laser radar, low-cost large screen display for tactical operations and digital communications capabilities.

One other exploratory development program, which is newly identified in our RDT&E request this year, is Space Applications Planning. The analytical efforts in this program define advanced system concepts and evaluate the economical and technical feasibility of these various concepts. To date, we have conducted efforts in such high interest areas as space navigation, midcourse surveillance, satellite inspection, multipurpose reusable spacecraft and the economies of recoverable spacecraft. We have also performed analyses on space escape systems, space antennæ and other special defense projects. We are requesting \$2.0 million to continue investigation into these and other important efforts.

MILITARY SCIENCES

Less well known than many of the programs discussed earlier are the areas of fundamental study from which our technologies and systems later develop. In budget activity nomenclature, these are grouped together as Military Sciences. Actually these programs embrace several categories—some in research, several in development, two FCRC contracts, and our studies and analysis work. Their common characteristic is that they are not specifically related to a weapon system, although each project is chosen with application to a particular military activity in mind. The programs included in this budget activity are shown in Table III.

TABLE III.—DEPARTMENT OF THE AIR FORCE FISCAL YEAR 1971 R.D.T. & E. BUDGET ESTIMATES—MILITARY SCIENCES (1)

(In millions of dollars)

	Fiscal year 1970	Fiscal year 1971
In-house laboratory independent research	4,3	5, (
Defense research sciences	80.7	1 78.
Environment	9.5	8. (
Materiale	22 2	1 23 (
Preliminary design/development planning	1 2	77.7
Preliminary design/development planning. Innovations in education and training.	ò: -	3, 9
Air Force Project Rand	12.6	11.0
Analytic Services, Inc. (Anser)	11.5	*;**
Studies and analyses, Air Force	.3	*:
Total.	136, 4	134, (

¹ These funds include laboratory operating costs.

DEFENSE RESEARCH SCIENCES

The largest single research effort under Military Sciences is the Defense Research Sciences program. It includes many different research projects in thirteen categories, as shown in Table IV. We are requesting \$78.3 million to support these projects, approximately \$16.5 million less than requested a year ago and \$2.4 million less than appropriated.

TABLE IV-DEPARTMENT OF THE AIR FORCE-FISCAL YEAR 1971 R.D.T. & E. BUDGET ESTIMATES

Defense Research Sciences

(In thousands of dollars)

(III thousands of dollars)	
Bubeloment	Fisoal year 1971
General physics	13, 905
Nuclear physics	
Chemistry	
Mathematical sciences	
Electronics Materials	
Mechanics	
Energy conversion	
Terrestrial sciences	
Atmospheric sciences	
Astronomy/Astrophysics	
Biological & medical sciences	
Behavioral and social sciences	1,000
(Total	79 200

As you are well aware, the Defense Research Sciences have borne the brunt of the level of effort reductions imposed by the Congress on the fiscal year 1970 program. I hope to satisfy the committee, today, that this reduced support has been judiciously applied. In pruning our basic research efforts, our Office of Aerospace Research has used the criterion of "a direct and apparent relationship.

to a specific military function or operation" as a major device for identifying the less essential research efforts.

We are frank to recognize, however, that we have not interpreted "direct and apparent relationship" to mean successful attainment of explicit technological or system objectives. These limitations persist because our research is designed to meet both near-term and long-term technological demands. Of course, near-term demands present no problem; these result from specific gaps in the scientific knowledge that supports a clearly developing technology. Current examples are analysis of single and multi-mode laser oscillators in support of laser technology and work on microwave acoustics for delay lines used in radars.

Research serving long-term demands presents a different picture altogether. This kind of research is undertaken precisely because an area of technology is not completely understood. However, in terms of military relationship, this is not as fuzzy as it may sound. Even though we may not know in advance the precise resultant technological process, we do know that such new knowledge will assist in removing barriers to required operational capabilities. For example, we are presently working on what we hope will lead to efficient hypersonic combustion. If we had hypersonic combustion systems, we know we could use them in low volume space boosters, in supersonic vehicles above Mach 4, and in efficient hypersonic cruise vehicles.

In his statement, Secretary Hansen reviewed in detail some of our efforts to assure a vigorous program of militarily relevant research. These lead periodically to the early termination of projects which prove to be unfruitful. These efforts are supplemented by our policy of seeking out the best talent we can find to do the particular kinds of research we need, wherever that talent may be located. Our emphasis is placed on the nature and quality of research rather than where it is performed. At present, we are emphasizing the areas of research shown in Table V. I have asked General Eddy, the Commander of OAR, to be available to provide the details for questions you may have in these areas.

About half of our scientific research program is conducted in-house, at Air Force research laboratories. Collectively, these laboratories also administer about 20 per cent of the research that is done by contract outside the Air Force. The balance of our outside research is accomplished through contracts and grants administered by the Air Force Office of Scientific Research. Of the externally contracted research, nearly 74 per cent is accomplished on university campuses.

TABLE V-DEPARTMENT OF THE AIR FORCE-FISCAL YEAR 1971 R.D.T. & E. BUDGET ESTIMATES-CURRENT AREAS OF BASIC RESEARCH EMPHASIS

Superconductivity
Ionospheric Research
Solar Forecasting
Chemistry
Organometallic Synthesis
Electrochemistry
Energy Conversion
High Energy—High Density Plasma:
Organic Photoconductive Materials

High Energy—High Density Plasmas Organic Photoconductive Materials Supersonic Combustion Electrofluid Dynamics Mechanics
Thermomechanics
Hypersonic Aerodynamics
Materials
Polymer Synthesis
Advanced Composite Materials
Electronics
Detection Techniques
Automated Military Data Processing
Life Sciences

Stress Physiology Training

Most of the rest is done by nonprofit institutions and industrial laboratories. In fiscal year 1970, the dollar breakouts for contracts dispersed among these different research institutions were approximately as follows:

(In millions of dollars)

	Industrial labs	Nonprofits	Universities
External USAF research	6. 9	1. 6	33, 9

University research

The protest issue of DOD sponsored research on university campuses has been of concern to us, because we have approximately 900 research investigations underway on roughly 150 university campuses. Actually, however, it is only at

those few university affiliated research centers qualified to do classified research, that Air Force programs have come under attack. The only example during the past year has been at MIT's Instrumentation Laboratory. We have taken steps to reduce classified research on campus, particularly where the classification has been imposed strictly because the principal investigator has access to security data. Of 13 contracts in this category last year, all have been declassified.

A small portion of our university research effort has been devoted to Project THEMIS. This is the DOD-wide program initiated in 1967 to strengthen the scientific and engineering research capability of lesser known academic institutions. By supporting 3-year step-down contracts on such campuses, the DOD has endeavored to enable less-favored institutions to become competitive with more established research centers and thereby to increase the breadth and selectivity of the national defense research base. There are 35 Air Force contracts in the Project THEMIS Program for fiscal year 1970. All are efforts in which university investigators have proposed their own projects, and they have been selected so as to assure relation to specified areas of military interest. These are as shown in Table VI.

TABLE VI—DEPARTMENT OF THE AIR FORCE—FISCAL YEAR 1971 ROTAE BUDGET ESTIMATES—THEMIS CONTRACT RESEARCH AREAS

Selection, Surveillance, Navigation and Control Energy and Power Information Processing Systems Technology of Military Vehicles Materials Environment Medical Behavioral and Social Sciences

Beginning with the fiscal year 1970 program, it was decided to withhold funds for any new THEMIS starts and to renew only those promising projects started in fiscal years 1968 and 1969. This policy will be continued. Moreover, as a means of transitioning to a situation (fiscal year 1972) wherein these efforts will compete with all other research proposals under the regular Defense Research Sciences program, THEMIS contracts are no longer reflected in a separate subelement of the Defense Research Sciences program.

Behavioral and social sciences

One research area attracting considerable Congressional attention last year was the grouping known as Behavorial and Social Sciences. At the time, our requested program consisted of projects in the areas of human performance, manpower selection and training, human engineering, foreign military security environments, and policy planning studies. The last two areas were the objects of specific recommendations for fund reductions.

Our fiscal year 1971 Behavioral and Social Sciences subelement will concentrate on behavioral sciences projects. Neither Air Force studies of foreign military environments nor our policy planning studies are being funded as part of the Defense Research Sciences program this year. The policy studies, which yield potentially important analyses of alternative military concepts and regional security policies, are now carried under a separate Studies and Analyses program element.

All research projects in the behavioral sciences result from unsolicited proposals so the precise study titles of projects to be started in fiscal year 1971 are not yet known. However, to be accepted, these proposals must show real potential for developing basic principles and methodologies useful in improving USAF personnel utilization and training practices. Last year, about two-thirds of the behavioral science research examined problems of human performance; the balance was devoted to problems of human interaction. We expect this year's balance to be about the same and are requesting \$1.0 million, of which \$300,000 will be used to complete THEMIS contracts.

INNOVATIONS IN TRAINING AND EDUCATION

Utilizing directly the products of our basic research in the behavioral sciences is the advanced development program, Innovations in Training and Education. This program is designed to test the applicability of learning theory and training innovations to specific Air Force problems. It also helps implement, through demonstration, the integration of education and training technology with Air

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Force operational activities. Carried out primarily by contract, in direct cooperation with such eventual users as Air Training Command and Tactical Air Command, projects accomplished under this program have led to significant savings in Air Force education and training resources. For example, systematic analyses of the training of F-111 Weapon Control System Mechanics/Technicians has resulted in a shortened course of study and better utilization of limited training facilities.

Our primary program objectives for the coming year are to carry out detailed studies and initiate procurement of both machines and software to incorporate proven advanced simulation techniques into our Undergraduate Pilot Training. We also plan to develop advanced instructional systems for technical training of electronic maintenance technicians and to adopt new instructional techiques in a systems approach to aircrew training. We are requesting \$3.5 million for these purposes.

ENVIRONMENT

One of the exploratory development programs in the Military Sciences activity is concerned with research in the earth, atmospheric and space sciences. This important program uses the results of our basic research in such fields as terrestial sciences, atmospheric sciences and astronomy-astrophysics to develop techniques and technology for direct application in aerospace systems. In the past, this program has made significant contributions to the design of ballistic and space systems and in resolving operational problems in communications, weapons delivery, surveillance and weather observation and modification.

We are requesting \$8.0 million in fiscal year 1971 to continue our environmental research program. Emphasis will be placed on such efforts as gravity and geodetic analysis to improve ballistic missile accuracy, re-entry communication problems and techniques for improving weather forecasts. Despite the direct military purposes of this research, it also offers potential understading of atmospheric dynamics that may find application in work on such problems as pollution and environmental control.

FISCAL YEAR 1971 RDT&E PROGRAM BY BUDGET ACTIVITY

Mister Chairman, in conclusion, I would like to comment briefly on our fiscal year 1971 program in terms of budget activity. The proposed program for 1971 and the approved program for 1970 are as shown in Table VII. As you will note, we are now using a new activity—Ordnance, Combat Vehicle and Related Equipment.

TABLE VII.—DEPARTMENT OF THE AIR FORCE FISCAL YEAR 1971 R.D.T. & E. BUDGET ESTIMATES—R.D.T. & E. PROGRAM BY BUDGET ACTIVITY

[In millions of dollars]

	Fiscal year 1970	Fiscal year 1971
Military sciences Alecraft and related equipment	136. 4 708. 2	134. 6 831. 3
3. Allesiles and related equipment	. 907.3	762. 8
4. Military astronautics and related equipment	642. 4 69. 1 302. 8	437, 7 78, 3 359, 6
7. Other equipment	302. 8 314. 3	359. 6 305. 4
Total		2, 909, 7

Some significant changes have taken place since last year. The Aircraft and Related Equipment activity reflects our increasing requirements for work on manned aircraft—particularly with the F-15 now entering into a more costly phase of its development cycle.

The Missiles and Related Equipment account has decreased by about 15 per cent as we pass the peak funding requirements for developing the Minuteman III and as SRAM development nears completion. Similarly, the Military Astronautics and Related Equipment activity has dropped to about two-thirds of the 1970 level, due to the termination of the Manned Orbiting Laboratory (MOL) program. There are, of course, marked changes within the budget activities, as shown in the following tables.

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MILITARY SCIENCES

I have already discussed some of the Military Sciences programs, as summarized in Table III. This year, we are requesting \$134.6 million—slightly less than our fiscal year 1970 approved program.

AIRCRAFT AND RELATED EQUIPMENT

Having a particular impact on the Aircraft and Related Equipment activity will be our pressing need to economically replace our aging tactical and bomber forces. The vital importance of this activity is reflected in Table VIII and in our request for \$831.3 million. These funds will permit us to continue the development of the F-15 air superiority fighter and B-1 advanced bomber. We will also be able to begin development of the A-X specialized close air support aircraft and the SCAD subsonic bomber decoy. As will be seen, this emphasis on a modernized force of manned aircraft carries over into other budget activities as well

TABLE VIII.—DEPARTMENT OF THE AIR FORCE FISCAL YEAR 1971 R.D.T. & E. BUDGET ESTIMATES—AIRCRAFT AND RELATED EQUIPMENT (2)

[In millions of dollars]

	Fiscal	year
	1970	197
B-111 squadrens.	45. 4	16.
R-71 squadrons	. 8 .	
7 squadrons	1.1	0
-111 squadrons	126. 3	48.
F-111 squadrons	2.0 .	
erial targets	1.2 .	
-5A airlift squadrons	34. 2	11.
erospace flight dynamics	32. 1	31.
erospace biotechnology	17. 1	19.
erospace propulsion	26. 5	27.
erospace avionicsircraft propulsion subsystem integration	46. 0	44.
ircraft propulsion subsystem integration	8.0	8.
dvanced aircraft navigation	5. 6	4.
ight intratheater transport	0	2.
light vahirla eubevetame	5.7	10.
dvanced fire control/missile technology	3. 0	2.
dyanced reconnaissance and target acquisition capability	4.7	
erospace structural materials	8.2	9.
/TOL engine development	8.0	5.
dvanced avionics	6. 8	ã.
dvanced avionics	7 5	_
ubsonic cruise armed decoy	9.1	33.
ational clear air turbulence program.	ĭ.ô	•
ONUS air defense interceptor	2.5	o .
uiet aircraft	3.0	2. 0
dvanced aerial target technology	Ŏ. Ū	•
4 avionics.	7	
TOI simple (II S /CDC)	2.0.	
TOL aircraft (U.S./FRG). -15 dyerse weather aerial delivery system.	175. 1	370.
-13	4.1	370.
-X aircraft	2.0	27.
-X aircraftircraft equipment development	14.5	11.
iiciait aquipment development	14. 2	11.
dvanced tanker	100.2	100
-1	100. 2	100,
Tabel	708. 2	831
Total	/06. 2	631.

MISSILES AND RELATED EQUIPMENT

The Missiles and Related Equipment budget activity provides for the development of missile weapon systems and technologies, as well as for the operation of the Eastern and Western Test Ranges. Although the proposed fiscal year 1971 program (shown on Table IX) of \$762.8 million, is considerably smaller than last year's, our need for improvements to our strategic, our airto-air and our air-to-ground missile capabilities has not diminished.

TABLE IX.—DEPARTMENT OF THE AIR FORCE FISCAL YEAR 1971 R.D.T. & E. BUDGET ESTIMATES— Missiles and Rolated Equipment (3)

[In millions of dollars]

	Fiscal year-	Fiscal year-	
_	1970	197	
Short-range attack missile	84.7	46. (
MINUTEMAN squadrons.	353.0	224.	
MINUTEMAN integrated command and control system.	20.0	0	
Minuteman rebasing	-0.0	77.	
Continuand data buffer.	Ŏ	10.	
NIKE targets	ž. o	Ĩ.	
Rocket propulsion	24. 7	25.	
Advanced air-to-surface missile guidance technology	4.2	5.	
Air-launched missile propulsion	ã	ĭ	
Advanced ICBM technology	15. Ŏ	••	
Advanced ballistic reentry system.	107. 0	105.	
Strategic homber negetration	2.1	100.	
Strategic bomber penetration Factical air-to-ground missile (Maverick)	40.6		
Air-to-air missile improvements	2.7		
Hard-rock silo development	25. 0	ň	
Short-range air-to-air missile (Aim-82)	14.0	37.	
Western test range	63. 5	67.	
Eastern test range	143.3	118.	
	140.0	110.	
Total	907. 3	762.	

Thus, the 1971 proposal includes such programs as Advanced Ballistic Reentry Systems (ABRES), MINUTEMAN Rebasing, Command Data Buffer and Advanced IOBM Technology, each of which will improve a different aspect of our strategic missile forces. Our program also includes funds for a new short range air-to-air missile to equip the F-15 and an air-to-ground missile to enable our tactical aircraft to kill small hard targets.

MILITARY ASTRONAUTICS AND RELATED EQUIPMENT

As I mentioned previously, the 1971 proposed program of \$487.7 million for Military Astronautics and Related Equipment is approximately one-third less than the \$642.4 million for 1970. The programs that constitute this budget activity are shown in Table X, where it is evident that the reduction resulted primarily from termination of the Manned Orbiting Laboratory (MOL) program. Now we are concentrating our activities on the unmanned space systems and supporting technology to perform the defense and communications functions already described.

TABLE X.—DEPARTMENT OF THE AIR FORCE FISCAL YEAR 1971 R.D.T. & E. BUDGET ESTIMATES— MILITARY ASTRONAUTICS AND RELATED EQUIPMENT (4)

Iln millions of dollars

	Fiscal year	
	1970	1971
Defense support program		
General purpose applications		
Defense satellite communication system	20, 8	6. 7
Special activities	239. 8	
Satellite control facility	36, 2	37. 0
litan III space booster	51. 3	35. 4
Manned orbiting laboratory	125. 0	-
Space studies.	1.1	Ŏ
Space applications planning	Ö	Ž. (
Advanced space power supply technology	ĭ 7	3.0
Space experiments support	16. 8	16.
Satellites, balloons and rockets	1.0	2.
Advanced space guidance	5.7	6.0
Advanced liquid rocket technology	11. 0	5. 0
Defense subsystem development and demonstration	13.1	0.
Jennies aubsystem development and demonstration	13. 1	υ,
Tactical satellite communication		٠, ١
Spacecraft technology and advanced reentry tests	2. 2	3. 2
Satellite system for precise navigation	2. 0	ļ. ;
Advanced satellite secondary propulsion system	. 5	1.0
Space data relay subsystem	2.4	
Advanced sensor technology	2. 5	7. 6
Midcourse surveillance system	0	2. 0
Hissile and space defense	2. 0	5. 0
Satellite data relay system	. 6	
Aerospace	22. 2	19. 5
Total	642, 4	437.7

ORDNANCE, COMBAT VEHICLE AND RELATED EQUIPMENT

In keeping with the desires of Congress, the Air Force is now using the Ordnance, Combat Vehicle and Related Equipment budget activity, which will mirror Army and Navy practices and facilitate comparison of all DOD ordnance developments. In the past, with the exception of two programs, all efforts in this new activity were listed in the Other Equipment budget activity. As shown in Table XI, our proposed program for 1971 in the amount of \$78.3 million has increased over the 1970 program, primarily because the Improved Aircraft Gun System has reached its peak funding period.

TABLE XI.—DEPARTMENT OF THE AIR FORCE—FISCAL YEAR 1971 R.D.T. & E. BUDGET ESTIMATES ORDNANCE, COMBAT VEHICLE, AND RELATED EQUIPMENT (6)

[In millions of dollars]

	Fiscal year	
	1970	1971
Advanced weapons and applications	8. 9 9. 0	8. 0
Conventional munitions Close air support weapons High-energy laser program	2. 0	2.0
Conventional weapons	15.1	
Armament/ordnance development	13. 4 3. 7	11. 0 20. 9
Truck Interdiction	10. 0 69. 1	78. 3

OTHER EQUIPMENT

The Other Equipment budget activity includes the development programs for supporting systems and subsystems, mostly in the areas of electronic warfare, surveillance, and communications. The supporting systems are those such as AWACS and our over-the-horizon (OTH) radars. Examples of subsystems that

will be used in full scale systems are the developments included under Penetration Aids for Manned Aircraft and Electronic Warfare Systems. The proposed program for 1971 of \$359.6 million (as shown in Table XII) has increased over the 1970 program primarily because of the AWACS funding requirements.

TABLE XII—DEPARTMENT OF THE AIR FORCE FISCAL YEAR 1971 R.D.T. & E. BUDGET ESTIMATES OTHER EQUIPMENT (7)

(in millions of dollars)

attagic Air Command communications and control networks (SACCON). at Attack Command and control system (PACCS). 1 F-energency rocket command system (ERCS). 1 To take the command and control system. 40 0 8 MUIS over-the-horizon radars. 2 8 F-the-horizon radar system. 2 9 1		Fiscal year	ar .	
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	Total	302. 8	359	

PROGRAM WIDE MANAGEMENT AND SUPPORT

The Program Wide Management and Support budget activity is composed primarily of two programs, (1) Development and Test Support and (2) Acquisition and Command Support. These provide funds for operation and management of the Office of Aerospace Research (OAR) and the Air Force Systems Command (AFSC) and include civilian pay and travel, transportation, rents, utilities, contract services, supplies and equipment for both military and civilian personnel. The fiscal year 1971 proposed program in the amount of \$305.4 million (Table XIII) is lower than the 1970 program of \$314.3 million because of economy measures necessitated by budgetary constraints and in spite of the increased personnel costs resulting from the civilian pay raise effective on 1 July 1969. Operating costs have been lowered primarily through personnel reductions.

TABLE XIII.—DEPARTMENT OF THE AIR FORCE, FISCAL YEAR 1971 R.D.T. & E. BUDGET ESTIMATES— PROGRAMWIDE MANAGEMENT AND SUPPORT (8)

In millions of dollars)

	Fiscal year	
	1970	1971
Development and test support: Flight test Center, Missile Development Center, Special Weapons Center, Armament Development Center. Acquisition and command support: Aeronautical Systems Division, Electronic Sys-	139. 7	133. 8
tems Division, Space and Missile Systems Organization, Aeromedical Division, Office of Aerospace Research, Headquarters, Air Force Systems Command	173. 9	170. 9
International cooperative R. & D. International military headquarters and agencies	. 2 . 5	. 2 . 5
Total	314. 3	305. 4

Mister Chairman, this concludes my prepared statement. And now, at the pleasure of the committee, Mr. Hansen and I will be most pleased to respond to your questions.

ADEQUATE R. & D. BUDGET

Senator McIntyre. Thank you very much, General Glasser. For the information of the committee I propose to follow the 10-minute rule. I myself have a great number of questions, but I thought that for the convenience of Senators coming and going the 10-minute rule might be very handy. It is my hope that we can go to 12:30, and then come back at 2 o'clock, subject, however, to being interrupted by votes on the floor.

Secretary Hansen, is the program represented by your fiscal year 1971 R.D.T. & E. budget adequate to support Air Force research and development objectives?

Mr. Hansen. Mr. Chairman, the answer to that is yes, minimally adequate. I would like to see more money being spent in Air Force Research and Development in some of the areas, but we have worked the problem very carefully in relation to other priorities in the Air Force, and in the Department of Defense. I am persuaded that we are spending all we can afford to in this area, and that the amount that we are spending will permit us to pursue it and get our job done with only acceptable risks.

Senator MoIntyre. Speaking to this very problem, Dr. Foster in his appearance before the committee expressed serious concern regarding this declining trend in overall Department of Defense R.D.T. & E. appropriations. He explained that the three services were given higher

allowances for R.D.T. & E., but that they were unable to support these levels within their overall ceilings. Will you recite Air Force

experience in this matter?

Mr. Hansen. Yes, sir. The original R.D.T. & E. submisssion that the Air Force made to D.D.R. & E. in June of 1969 was \$4.7 billion approximately. As a result of fiscal guidance and consultation within the Air Force and with D.D.R. & E., on the 24th of August there was an OSD program budget decision which was approximately \$3.3 billion for Air Force R.D.T. & E.

Then, in a series of exercises to balance priorities between R. & D., operations, production, and other priorities, this amount gradually was reduced until our final submitted request for the fiscal year 1971

program of \$2,909,700,000.

Now I will say that from the parochial point of view of an R. & D. man, I think that the R. & D. amount in the Air Force should be more but I also must say that were I sitting in Secretary Seaman's chair, I feel that I would have made the same decisions that he has made as to the relative priorities, and how to allocate the funds under the fiscal guidance to today's force in being versus the R. & D. effort to prepare for tomorrow.

Senator McIntyre. General Glasser, you made the point that this is your smallest R.D.T. & E. program request for the past 10 years, and that in terms of 1963 dollars you are buying 45 percent less R.D.T. & E. in fiscal year 1971 than back in 1963. Do you consider your fiscal year 1971 request adequate to support a balanced and meaning-

ful R.D.T. & E. program?

General GLASSER. I would certainly have to agree with the thesis presented by the Secretary, but I would want to expand it in the

following fashion.

Certainly the program we are presenting is an adequate program based on the overall fiscal limitations that we have, if viewed in the sense that we are doing the R. & D. that is necessary to meet the procurement objectives of the future and the maintenance of the force

in being.

I have a personal concern, however, and I suspect this may be the concern expressed by Dr. Foster, that this amount is not enough to do all those things that are specifically identified as required. We need more choices and we need more explorations of things that won't ever go into production. I hope this is a very short term situation that we find ourselves in, and that it is not too many years before there will be additional funds available for the R.D.T. & E. efforts that will afford us more opportunities for choices as to how the forces ought to be modernized.

PREVENTION OF REPEATING MISTAKES

Senator McIntyre. Secretary Hansen, if any lesson is to be learned from programs such as Dynasoar, Skybolt and MOL, where billions of R.D.T. & E. dollars were spent prior to cancellation, it should be to realistically estimate at the outset what the costs will be, and if technology is sufficiently advanced to provide a reasonable degree of confidence in attaining program objectives. What is the Air Force doing to avoid these pitfalls?

Mr. Hansen. That is a very good question, Mr. Chairman. We are doing many things. We share the concern of the Congress about what has happened to these programs.

You touched a nerve with me when you mentioned the MOL. It was

very distressing to me to have the MOL program canceled.

I felt that it was a good program, that it was progressing well. We simply could not afford it, and one of the things that we are doing is what is, I believe, a better job of longer range planning, to try to help insure that we won't start any programs that we can't afford to carry through.

If we get into this discussion on these particular programs, I think

this is relevant to my personal thoughts about LIT.

Now with respect specifically as to how do we avoid the type of cost growths that we have had in the past, we have made considerable effort to try to improve our ability to do within the Air Force a job of estimating how much things cost. We are trying to operate in a way that does not commit us so far beyond the point where we can see, in order to avoid the kind of mistakes that I think have been made in relationship, for instance, to the C-5A.

This is the milestone procedure that I am sure you have heard about before, in which by prior agreement we establish certain thresholds of achievement which we must get to before we will make the decision

to proceed to further expenditures beyond that point.

I think a good bit has been done to improve the actual management of our programs. General Ferguson addressed himself at length to

that vesterday I believe.

I think the most significant thing in that is that we recognize that cost is a program variable along with performance and schedule, and that we don't necessarily solve all problems associated with technical problems and schedule by spending more money, that it is important that we plan a program carefully, and that we work to that plan and monitor our progress to the plan. Where there are differences we examine those differences, and then take a course of action which takes into account in a more balanced way than has been done in the past the cost, the schedule and the performance.

I am not being critical of the past. I was involved in, for instance, the Atlas program, where the name of the game in that program was not cost. It was performance and schedule. It was make it work and get it in the field as quickly as we can, and it cost what it cost.

In today's environment we all know that is not the emphasis. The emphasis is on a more balanced program, a more balanced basis where we must, when it looks like we are running into a problem, consider all of the alternatives, including such alternatives as giving up performance, changing requirements, changing schedules or doing whatever we need to do to make sure that we allow only such cost growths as are absolutely required.

LIABILITY RESPONSIBILITY

Senator McInter. You gentlemen come here this morning and you talk about this budget that you are presenting as adequate, but you have your own personal misgivings. You say that the priorities have forced you to relook at your budget requests, and you have complied with orders from up above.

But one of the things that the laymen, and I speak of myself in that respect when it comes to technical sciences, one of the things that we are up against in defending the budget that we have are these avenues that you went down, but I think it was General Glasser who said, you never went to production on. But there are these avenues that you went down and did go to production on, and I can think, for instance, of not production perhaps but prototypes of the tank.

That is Army, and that has been kind of a difficult one for us to explain. The Cheyenne helicopter is another, where suddenly this thing

was curtailed because of the rigid rotor problem.

I think also of the Mark 48 torpedo, where Westinghouse got to a point where they had to turn around and go back and redesign the system. So that just from the layman's standpoint it seems to me that the thrust of you gentlemen should be to concentrate on what I would call reliability, and that when you get to the point in engineering development and advance development that you stop and turn around and go back and recheck, and check before you move into production, and get yourself in a position where we have difficulty defending you, and it results in the curtailments which you saw last year.

DEEMPHASIS OF FEDERAL CONTRACT RESEARCH CENTERS

Now for the time being just one further question. Your estimate indicates that you will need less support from your Federal contract research centers, Mr. Secretary, in fiscal year 1971 than in fiscal year 1970. Do you believe that this trend may be continued, and that less reliance may be placed upon these organizations in the future without

detrimental affects on Air Force programs?

Mr. Hansen. We hope that the downward trend in FCRC's will not have to be continued because one of the elements of their strength is that they have the stability to attract and retain high quality people that they must have to carry out their obligations. Even if we held them at a constant dollar ceiling, and inflation continued as it has in the past, there would have to be less actual people working in the FCRC's year by year.

We view the whole problem of the FCRC's and the relationship with the Air Force and with the Congress as a matter of concern. There is a need for planning on our part as to where this thing does go.

In some areas our in-house capability is improving, and the depend-

ence upon FCRC's is less today than it was a few years ago.

Some of these in-house capabilities, however, are being scaled down too, and so it is more difficult to absorb in-house tasks that FCRCs are doing than it would be if we were not subject to the in-house limitation.

In some cases ways have been found to have jobs done by private corporations that were thought to be essentially FCRC jobs, such as the case where the Thompson Ramo-Woolridge Corp. is handling the system engineering function on the MINUTEMAN program.

It is my feeling that there is a problem with the FCRCs. The fact that they are questioned in the ways that they are by the Congress indicates that we have not adequately made Congress understand what they do, or else we are not doing it right.

One of the things that I hope to do is to gain a better understanding of the Congress' views relative to the Federal contract research

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centers, so that I can assist in guiding our long-range policies for these

organizations.

Senator McInter. Just quickly before I yield to Senator Goldwater, one of the things that appeared last year was that the Defense Department was now saying to the FCRCs, "We are perfectly willing for you to undertake these operations in areas other than defense," and I think that this might give them a little bit better profile or image with Congress, if we did not think of them as just some offshoot of more spending of money of the Defense Department. Now, I don't know what progress has been made. We will go back to that. Do you want to comment on that?

Mr. Hansen. Yes, sir; if I may, Mr. Chairman. We are encouraging the FCRC's to branch out into other areas, in which they are qualified to make contributions to the national requirements. Some progress

in the last year has been made in that respect.

We are subject, however, to a limitation on the total dollars for FCRCs with respect to what else they can get into.

Senator McIntyre. Senator Goldwater?

ARMING OF SCAD

Senator Goldwater. General, the SCAD is being designed with the option to be armed with a nuclear warhead. If this option is available, what is the rationale for not arming all SCAD's with a nuclear warhead?

General GLASSER. Senator, the SCAD is designed to be an evolutionary system. From the outset, it would be our intention to design it for the capability for being armed, but when it first emerges from the development cycle, [deleted].

When it first appears on the enemy horizon it is going to be most

credible as a decoy. [Deleted.]

STRIKE CAPABILITY OF MISSILE VS. DECOY

Senator Goldwater. What tradeoff is required to achieve the strike capability that differentiates the armed missile from the decoy?

General Glasser. When we have the armed version available, I suspect that it will always be used in its armed role, because as an electronic type, I have great concern about the counter-counter measures available to an intelligent enemy. He can exploit synthetic signals that we are sending back, and he will learn to detect which is the decoy, or at least he will learn to detect within a reasonable probability which is the decoy.

We don't want him to have that option of exercising that probability and saying "I think that is a decoy, so I won't go after it."

We want to make him go after it even when he thinks it is a decoy. For that reason I suggest we will probably always go armed once that capability exists.

Senator Goldwater. That answers the next question that I had.

General GLASSER. I am playing to your long suit.

Senator Goldwater. Yes, you sure did. I will have to make up some more.

Mr. Hansen. Senator Goldwater, if I may just expand a little bit, we view the arming of the decoy as being primarily for the purpose

that General Glasser stated, to make a decoy so that the enemy can't ignore it, rather than to have the warhead primarily for assured des-

truction purpose.

This enables us to have a little cruder guidance than pinpoint accuracy. It just has to be good enough to be very sure that the enemy would not care to ignore it and not expend one of their interceptors.

Senator GOLDWATER. That makes sense.

SCAD COMPLIMENTS B-111

General, in your statement you point out that the purpose of SCAD is to enable the B-52 or the B-1 bomber force to penetrate improved enemy air defense. How does SCAD fit in with the penetration aids that have been designed for the B-111?

General GLASSER. The FB-111?

Senator Goldwater. I refuse to call it a fighter.

General Glasser. Yes, sir, I understand. Well, we simply haven't considered putting it on the B-111. It is a much smaller airplane. It is much more capable than the B-52 for getting through the defenses, and it would be used in the shorter-range modes. This is one of those cases where you get into a cost tradeoff. SCAD's will not be inexpensive devices. They are fairly expensive.

Senator Goldwater. What are you talking about? General Glasser. A few hundred thousand dollars.

Senator Goldwater. Apiece? General Glasser. Yes, sir.

Senator Goldwater. Thank you.

General Glasser. For that reason you have to trade this off against the aircraft that you are bringing in, and if the B-111 is going to be required to carry SRAM for penetration of terminal defenses, then you would be giving up SRAM spaces to carry SCAD. We anticipate in the bigger bombers that you will have a mix of SRAM and SCAD which is based on the defenses you expect to encounter.

DESIGNED PERFORMANCE

Senator Goldwater. That makes sense. In past years when the specifications for the AMSA were being considered, there were two schools of thought as to what speeds should be specified for the aircraft. Currently the technical characteristics call for a Mach [deleted] speed at altitude and [deleted] at sealevel. So it is obvious that the questions were resolved in favor of a supersonic aircraft.

Since the primary penetration tactic of the B-1 is for low altitude penetration, could you discuss for us the rationale that calls for a supersonic capability altitude but subsonic low-level capability regime

in which the aircraft is designed to perform?

General GLASSER. Yes, sir. The previous positions that you were referring to contemplated the possibility of having a Mach [deleted] at altitude and [deleted] at sealevel. Let me dispatch that point first.

The reason for abandoning the Mach [deleted] requirement at sea level was that in the low-level penetration modes it was felt that a high subsonic speed was required and a low supersonic speed was desirable, if it came to you without a great price. This is for the classic

reasons that supersonic aircraft have better penetration and better

evasion capability than do subsonic aircraft.

It was our belief that the time that an aircraft that was designed for Mach [deleted] at high altitude, which had the specified short takeoff capabilities, which had the Q limits associated with these and other
flight regimes, and which was designed for the thermal and the overpressure loads it would receive from nuclear weapons in the target
area would automatically provide an airplane with a Mach [deleted]
capability on the deck.

When we examined this in more detail, we found out that indeed it did not give a Mach [deleted] capability on the deck. It gave something less than that, and to get Mach [deleted] on the deck would require added features which would contribute to both added weight.

and cost.

Since we could not quantify a specific utility above the [deleted], mach [deleted] at low altitude it was concluded that the best thing to do was to specify Mach [deleted] but with the possibility that we may have the contractor look at this when we select one to see if there is

a tradeoff that might be worth making.

Now, as to the Mach [deleted] at altitude, I would like to expand this for the record, however I don't have all of the material in my head. But there are profiles, penetration profiles, that contemplate a significant fraction of the penetration being at high altitude in the hostile area, for example, through an AWACS zone. For this reason it was again felt that the greatest possibilities of penetration in some cases were supersonic speed at high altitude as opposed to low altitude penetration at high subsonic speeds. We feel this capability will provide us with the operational flexibility required against an uncertain future threat.

Senator Goldwater. Do you think there is enough difference be-

tween [deleted] and [deleted] to worry about?

General GLASSER. I can give you a personal view that there is not, but, as I am sure you are aware, there is a great deal of pilot debate on that subject. There is a considerable body of opinion that feels that there is great benefit in going to Mach [deleted] as opposed to Mach [deleted].

Senator Goldwater. Is it that close?

General Glasser. The simple fact of getting over the sonic barrier means quite a bit to some people.

B-52 EXTENDED LIFE

Senator Goldwater. General, the B-1 is proposed as a replacement for the B-52. At the same time the work goes on with the B-1, however, we are developing the SRAM for application to the B-52, with the rationale that this would extend the life of that aircraft. How long can the B-52s life be extended, if it can be extended at all with penetration aids such SRAM and SCAD?

General Glasser. Yes, sir. We talked about this with the committee yesterday, and you have to first of all define the extension of life. What we mean by extension of life in this context is the operational utility life. When do enemy defenses become so severe that the B-52 cannot afford to go in? We are not talking in terms of what we usually speak of on the B-52, extending its E hours.

By some estimates the B-52 operational life is at an end already, so when we speak of extending the operational life of the B-52, in that sense we mean raising the number of B-52s that will successfully penetrate the enemy defenses. As the B-1s come in and gradually replace the B-52s, then of course you can realize a significant improvement but there is a continual drawdown of the B-52 force as the enemy defenses build up. What we are speaking of here is raising that curve, delaying the point in time when penetration is no longer available.

METAL FATIGUE FACTOR

Senator Goldwater. Aren't you actually reaching the point in time when metal fatigue will begin to take effect?

General Glasser. Not in the G's and H's, sir.

Senator GOLDWATER. How many hours can the G's and H's fly before you get metal fatigue?

General GLASSER. I don't have the numbers here. I can supply them

for you. But it carries the aircraft on out into the 1980's.

Senator Goldwater. I thought it was in the neighborhood of 4,000. Was that the B-47?

General Pitts. I am not certain, Senator.

General Glasser. I don't have it in terms of numbers. We will get it for you and insert it in the record.

(The information follows:)

The B-47 did have a safe service life expectancy of 4,000 hours. The B-520 through F's were originally designed for a service life of 4000 "E" hours. The "E" hour is less than actual flying hours and is used to measure fatigue damage based on the flying environment. The B-52D model which is being utilized in Southeast Asia, has been modified with a wing modification that extends its service life from 4000 to 6000 "E" hours. Based upon forecast damage rates the B-52D's should last until their scheduled phaseout in the FY 77/78 time frame. As a result of cyclic fatigue tests, the newer model B-52 G's and H's have an expected service life of at least 12,000 flying hours. If we continue to fly them in the current flight regime, we have confidence that these aircraft can continue to fly into the 1980's without any major structural modifications.

Senator Goldwater. It is my feeling that SRAM and SCAD do not do much good for these birds. They have about had it.

General GLASSER. G's and H's should fly about 5 years with the

SRAM.

General Low. That is right. So far as the program extends, Senator Goldwater, we show the G's and H's in the force.

Senator GOLDWATER. Do you think they can fly in the 1980's?

General GLASSER. Into the eighties.

General Low. Yes, sir; from a structural standpoint. Of course, we don't know this with a high degree of certainty. This is an area in which you really don't, but certainly we can prognosticate.

Senator Goldwater. That is interesting to hear. I thought it was

otherwise.

Mr. Chairman, I have had my 10 minutes. I can submit these other questions, and he can answer them for the record. I don't want to take your time.

Senator McIntyre. If you are satisfied that you have pursued orally

what you would like to know.

PREPARED QUESTIONS FROM SENATOR GOLDWATER

Senator Goldwater. These are staff questions and they are very good questions. I have asked all of them but about three, so I will just submit these, if it is all right with you, and the Secretary and the General can answer them.

Senator McIntyre. All right, they will be submitted for answers. Senator Goldwater. Thank you.

(Questions submitted by Senator Goldwater. Answers supplied by the Department of the Air Force.)

Question. One of the primary purposes of SRAM is to enhance the penetrability of manned bombers, including the B-1. SRAM has experienced serious developmental problems. If SRAM development fails or is discontinued, wouldn't this undermine the justification for the B-1?

Answer. Senator, with respect to your statement on SRAM, it is true that the SRAM development to date has experienced problems. However, I believe it is also important to note that the difficulties encountered in all cases have been attributed to quality control and not the result of failing to meet system design specificaions. For this reason we have confidence that SRAM development will be successful.

The development of advanced penetration aids will enhance the capability of strategic bombers to penetrate area defenses and to attack terminally defended targets when necessary. SCAD is the pen aid that will be used to enhance penetration of area defenses. The primary purpose of SRAM is to allow a bomber which has successfully penetrated area defenses to attack terminally defended targets while remaining outside these terminal defenses, if necessary. However, the ability of bombers to penetrate air defenses is a function of many variables such as aircraft characteristics, tactics, and the quality of penetration aids carried on the bomber. Experience indicates that both carefully designed aircraft characteristics and carefully designed pen aid qualities are required. The B-1 will incorporate basic design characteristics that will provide significant penetration survival improvement over current bombers. These design features include reduced radar cross section and infrared signatures, speed versatility at high and low altitude, and the capability to penetrate at lower altitudes, which not only improve the basic aircraft pentrability, but also make the problem of designing pen aids less difficult. The B-1 with its higher speed would be exposed to the defenses for a shorter time; for a given level of protection its ECM requirements are less than the B-52 because of smaller radar signature; and its lower penetration altitude reduces detectability by ground radars.

For these reasons the failure of any single penetration aid, such as SRAM, would not undermine the justification for the B-1. Further, the B-1 is being designed to carry not only SRAM and SCAD, but all projected inventory weapons. Therefore, should it be necessary to use only gravity lay down weapons to attack terminally defended targets, the capabilities of the B-1 in terms of performance and inherent characteristics will become even more important and will permit greater flexibility in targeting and developing tactics to maximize its effectiveness.

Question. This year's budget proposal requests funds for production of the SRAM. However, there is also requested a substantial sum for research and development of SRAM. The magnitude of the R&D effort indicates a substantial element of concurrency in this year's buy. Does this not invalidate the present policy of minimizing the development risk before entering into production contracts? What is the confidence factor in the successful development of the SRAM at this point in time?

Answer. The research and development funding is the current estimate for the testing efforts to be accomplished under the development contract in FY 1971. The test data available to date provides a moderately high confidence factor that the development will be sufficiently complete to warrant production go-ahead by June of FY 1970. If production go-ahead is warranted at that time, the Air Force will seek the approval of Congress prior to the initiation of the production program.

There are several other parameters that must be considered in transitioning between development and production such as the threat and production con-

tinuity. The threat clearly indicates that the bomber force requires SRAM in order to penetrate the terminal defenses in the early 1970 time period. The second important factor is the ability to retain the core of the limited development SRAM production capability; thus, not having to requalify the various suppliers.

Question. How many SRAMs does the Air Force plan to buy? What is the estimated program unit cost for each SRAM? Is any money included in the FY 1971 budget for B-52 modification to make them SRAM capable and, if so, what is the amount and in what line items does it appear?

Answer. The Air Force plans to procure a total of [deleted] SRAM for the B-52 G/H and FB-111 bomber force. The initial increment of [deleted] will be procured in FY 71, with a maximum production rate of [deleted] per month being planned for the remaining quantity. The estimated program unit cost for each SRAM is [deleted]. (This is the cost (\$ in millions) of development (\$434.1), missile procurement and spares (\$645.7) and military construction (\$10.9) divided by the total buy of [deleted] SRAM.)

There is \$92.5 M included in the budget for modification of the initial quantity of B-52's. The plan supports a modification rate of about [deleted] aircraft per month thru [deleted] until the entire B-52 G/H force is SRAM capable. This aircraft procurement funding is included in P-1 line number 33.

modification of In Service aircraft.

Question. The B-1 is being designed with a dispersal/penetration potential which assertedly will give it a capability to survive both a missile attack in sufficient numbers to be a credible retaliatory threat. Will you discuss the extent to which the enemy's targeting problem will be complicated by the dispersal potential of the B-1. Has the survivability of the B-1 been tested in war games against SLBM attack? And, if so, how did the B-1 fare? How did its survivability compare with the B-52 and the FB-111?

Answer. Senator Goldwater, as you are aware the improving Soviet SLBM capabilities have resulted in an increased danger to our strategic forces prior to launch. These improved Soviet capabilities have reduced the warning time for launching our forces and one of our responses has been to disperse the

strategic bomber forces.

The pre-launch survival of the B-1 force, against the more severe threats postulated for the future, will be assured through two major design objectives which will provide improved capabilities over those of the current bomber force. First, the B-1 will be designed with take off and landing characteristics that will permit dispersal to a much larger number of airfields throughout the country. For example, the number of potential dispersal airfields for the B-1 will be about five times greater than for the B-52. The B-1's ability to disperse widely will significantly complicate the targeting problem by presenting the enemy planners with a very large number of potential launch and recovery sites.

Second, the B-1 will incorporate design features which will greatly improve its ability to successfully reach a safe escape distance away from the airfield. For example, the B-1 will be designed to have about [deleted] times the tolerance of the B-52 to blast overpressure and more than [deleted] times the tolerance of the FB-111 to thermal radiation from a nuclear detonation. Because of these characteristics the minimum time required for safe escape of the B-1

will be less than that of our current bombers.

The B-1's inherent potential for wide dispersal combined with its quick reaction capability, gives us high confidence that it will be able to survive future threats in sufficient numbers to be a credible retaliatory force. Recent Air Force studies have shown that this is the case and that the pre-launch survivability of the B-1 force will be greatly improved over that of the current bomber force. The survivability of the B-1 up to this time, as you suggest, has not been tested in JOS War Games, however, such an exercise is now in the planning stage.

FUTURE AIRPLANE USEFULNESS

Senator Goldwater. I would be very interested in a paper on the projected life of the G's and the H's.

General GLASSER. Yes, sir.

Senator Goldwater. I don't know where I got stuck with that 4,000 hours, due to the flexibility of the wings and the root and in the main spars. I have that figure in my mind. I might have dreamed it one night.

General Low. No, sir; I am quite sure there was such a figure and, of course, we have had major mods on the aircraft to extend that number, but I think we can get the right numbers for you and the

right words, and what the mods are.

Senator Goldwater. Would your taking them into the 1980's hold true if we continue in Vietnam that long, and we continue to use these?

General Glasser. None of these aircraft are used over there.

Senator Goldwater. None of the G's and H's?

General Glasser. No, sir; they are all reserved and operating only in the States, and in a very minimum mode of operation.

Senator GOLDWATER. What are the oldest ones there?

General Glasser, D's.

General Low. The D's are conventional bomb carriers and are the only model we have deployed to Southeast Asia.

Senator Goldwater. They must have quite a few hours.

General Low. Yes, sir.

Senator Goldwater. Do you have any idea what they will run a year over there?

General Low. No, sir; but it is a very high number. They are flying

at tremendous rates.

General Glasser. There are two separate fleets, and the others are the ones programed out of the force. The G's and H's are being reserved, the 255 that are in the force. They are accumulating very few hours annually as we go along, so even if the number is 4,000, and I will validate exactly what it is, this gives you a number of years, quite a number of years of service.

Senator Goldwater. Thank you very much, Mr. Chairman.

Senator McIntyre. Thank you, Senator Goldwater.

Senator Murphy?

Senator Murphy. Thank you very much, Mr. Chairman.

REASON FOR LOW-BUDGET REQUEST

General, I am sorry I had to leave and come back, and missed a great deal of the testimony. In your opening statement, you say that this the smallest R.D.T. & E. program request submitted in the last decade.

Now is the reason for that that you don't need it, or is it caused by outside pressures? Is it caused by the hue and cry that we have been subjected to lately about the great amounts of money spent by the military? The propaganda war, if you will, that has been going on inside the United States?

General GLASSER. I think it is a mixture of all of these, Senator. Both the Secretary and I have commented on this in the record.

Let me extend at least my version of it and ask the Secretary to comment, too, if I may. It is a combination of all of these various pressures that you speak of, but the request achieves a balanced program with the funds that are available to us overall.

In looking at the amount of funds that are available to the Air Force, and looking at the outstanding requirements to maintain the Air Force as a viable force, and looking at the requirements for modernization in the procurement accounts, looking at the things that must be done in the research and development program to accommodate all of those, this is an acceptable program, an adequate program.

As I commented earlier, however, I am not happy with it, because I think it is precluding our being able to do things for the further out future that should be done. It is not allowing us the opportunity for as many choices in the future as we might like to have, and from that standpoint I would certainly classify it as inadequate. Still, I certainly would not do it any differently myself if I were the Secretary of Defense, given the limitation of funds overall.

Mr. Hansen, do you want to add to that?

Mr. Hansen. That is a very good statement. As I understand the system, the President has given guidance to the Bureau of the Budget, and to the Secretary of Defense. He in turn has given guidance to the services and the defense agencies as to how much money we should plan on, not only for this year but for the out years.

Within the Air Force there was a preliminary dividing of the total

Within the Air Force there was a preliminary dividing of the total amount among the R. & D., the procurement, the operation and maintenance and the various accounts. We then built a program to that amount of money, and examined together the various elements of

the program.

We tested it by determining if we put more or less in each area what would that be. This was a process where we finally arrived at the point where we felt that the belt tightening was equitably distributed among the operating forces, the research, and development, the procurement accounts and so on, and so we arrived at what we feel is a very tight situation, but it is in accordance with the fiscal guidance.

Now I am sure that the fiscal guidance derives from the factors that you mentioned, Senator Murphy, the desire to shift the priorities in the country, the feeling that more money is being spent in defense than it should be. If I might say so, I think that very fact itself is a tribute to the Department of Defense, that it has kept this country secure for so long the people have gotten to feeling so secure that they feel they really don't need defense.

NATIONAL SECURITY PRIORITY

Senator Murphy. This is my point. The whole purpose for the Department of Defense is the security of the country. I have the greatest regard for the civilian side, but in my experience over the last several years, there has been too much imposition of civilian planning on the military. Otherwise we would not have some of the problems that we have today, I believe.

I just came back from the floor, where I listened to one of my colleagues in a diatribe on what is going on with the Air Force in Laos. I think I understand this reasoning. We had better understand

our conditions.

The job of the military is the security of the country, and these other priorities that we hear so much about—and I have had some experience with those, too—I think in many areas they could get along

and do a better job with maybe 20 percent less if they had better management. If our national security is not preserved, the rest of it doesn't really matter; does it?

Mr. Hansen. That is correct.

Senator Murphy. I think the matter of priorities should be carefully explained. That leads me to another subject.

PERSONNEL UTILIZATION

In this committee there was a condition raised about certain civilian salaries in the aerospace industry.

After a discussion, it was decided that those limitations on salaries would not be removed but the restrictions be raised so that the Secretary of Defense could designate as many salaries as he felt were valid.

Since that time I have come across information that indicates that misinformation has been sent up to the Department of Defense in this area. I wondered if the General might speak briefly to the importance of that particular function in the overall advance planning.

I want the record to show that this is not just another facet of the Air Force that somebody thought up, but is an extremely important function, and must operate at the highest efficiency. Otherwise we would be better off not to have it at all, because we might be completely misled by mediocre or second-rate thinking and planning.

Would you address yourself to that, General?

General Glasser. I think you have very eloquently stated the case. Senator. I think one need only look at the record to see what the contribution of these Federal Contract Research Centers has been in the past.

You strip away all of the conversation that has gone into this subject, and you find some very dedicated people who have made some

very major contributions to the defense of the country.

The Aerospace Corp., which probably has been more maligned than any of them, and in your State incidentally, is really the successor of a number of previous companies that had their inception back in the ballistic missile days, and which evolved into the space program. There is absolutely no question in my mind that had this organization and its predecessor organizations not existed, there would not have been a lunar landing this year, even though they have no connection with NASA.

In this connection I might drop back to a comment or question by the Chairman earlier regarding the moneys that went into programs like SKYBOLT, DYNASOAR, and MOL, which were then canceled without reaching fruition. I would hope that the inference would not be drawn from the record that this money was wasted.

Naturally we all deplore the fact that these programs did not go to fruition. They were good programs, and not any one of the three was

terminated for technical insufficiency.

They were all terminated for one reason or another, but the technical contributions that they made to the field, which were then incorporated into other programs, were huge. By some estimates all of the money that went into those programs was wisely used. That is an exaggeration, I am sure, but the investment certainly was not a great loss.

To speak to some of the other organizations, for example, the Lincoln Laboratory, Bedford, Mass., that was created for the establish-

ment of the SAGE systems and the Dew Line: The development of the early air defense of the continental United States was a tremendous chore that could not possibly have been done by uniformed military personnel or even by the civil service people within the country.

The point is that there is a dynamism in this business that people don't recognize. Within the civilian community we can have a technical breakthrough and exploit it, because you can divest yourself of the saddlemakers and bring in automobile repairmen, if that is what is necessarv.

The military has a much slower transition. You have to go through a

generation, so to speak, of people before you can transition.

This is a very, very important piece of our business that has to be fulfilled, and which in the past has been very adequately fulfilled by these organizations of which you speak. I think we would be in deep trouble if we did not have them, and we worry about this a great deal as we continue to face the criticisms.

Senator MURPHY. In other words, in your opinion, the operation of these shops has been a good operation, and it is not one which should suddenly be restricted and measured by the yardstick of civil service or military. They are actually more industrial oriented than

military oriented in their facilities.

General Glasser. That is correct. I certainly don't want to excuse certain mistakes, excesses, and so forth. They are manned by human beings. But if you look at an overall assessment, as you want to be looked at in general yourself, the answer is that they have a very, very creditable and commendable record.

MOTIVATION

Senator Murphy. And in your opinion this restriction that was inadvertently put on and is now misunderstood in some areas might impede the progress and the success of these operations?

General Glasser. It very well could.

Senator Murphy. What I am trying to say it this: They have men who I know can walk out the door and go two blocks down the street and make a lot more money, and a lot of these men are dedicated men. Would that be a fair statement?

General Glasser. There is no question that that is corrrect, sir. Senator Murphy. That are handicapping themselves financially in order to do the work that they feel is important to the future of the country.

General Glasser. Yes, sir. However, by a passing comment here, I would not want to underwrite the whole salary structure of any of these companies.

Senator Murphy. Oh, no.

General Glasser. Because there are things in there that probably need correction.

Senator Murphy. I was developing this, as the chairman knows, because I think there was a misunderstanding and a lack of knowledge of exactly what these shops do when we put the salary limitation on, if you will recall.

Senator McIntyre. I do.

Senator Murphy. And strangely enough what we are talking about now is a most important function, and the entire thing is hanging by a fine thread—about \$240,000—and it does not make good sense to me, and that is why I have raised it this morning.

General GLASSER. I think the most worrisome thing, Senator, is that

this is a very delicate organism.

Senator Murphy. Right.

General Glasser. You can cut these salaries, and that in itself is not what is going to destroy the organism. What is going to destroy it is the nervousness of the population within these companies. If and as they begin to detect that they are the whipping boy of the Nation, they may feel that there is just no sense in staying with this outfit. Once they get the idea, "If everything we do, no matter how well we do it, turns out wrong," then you may see that the bright young guys who want to get ahead and who want to get the psychic income of being applauded, are not going to stay, I think that is the more serious aspect of this contest.

Senator Murphy. I thank you very much, General.

Mr. Hansen. Senator Murphy, if I might just add two points in the general area that you are talking about here, with respect to the salaries, before this committee last year I made the statement that I think the basic issue is whether or not the salaries should be compared with industry or with government or with what.

I stated last year that it was my opinion that if salaries were compared with industry, as I thought appropriately they should be, then the salary structure that we have was not significantly out of line.

Now, in implementing the new provision in the law, the President has issued guidance under which our determination of appropriate salary should be made. That guidance states that one of the things that should be taken into account is compensation generally paid to officers or employees of the government engaged in similar work, and compensation generally paid to officers or employees of private non-profit organizations other than the Federal contract research centers and engaged in similar work.

There is not a statement in there that comparison should be made with private industry. Now, this is related to what I said to Senator McIntyre earlier, that I think that we need to know what the concerns of the Congress and of the administration are in order that we can be guided in determining how these organizations should be administered.

I was disappointed by the White House guidance, because my suggestion as to these guidelines included a comparison with industry. Some place along the way the comparison with industry was omitted.

I don't say that it should be compared exclusively with industry. I think that the total picture of compensation, of technical scientific people, wherever they are, should be taken into account, and appropriate scales should be developed, and to this end I might say that the Aerospace Corp. has engaged an outside consulting firm to make a complete study for the Aerospace board of trustees on a national basis of the salary compensation plans in all sectors of our activity, so that they can advise the board of trustees, and I think that is a very good move on their part.

The second point that I wanted to make is that in thinking about the Federal contract research centers broadly, we must recognize that we are where we are. Whether we came to this point properly or not is a subject for other debate, but these are organizations in being. They

have been developed over a period of years. They do a very essential

job for us.

It is my personal belief that there are other ways that that job can be done. It could have been done perhaps in a different way at that time, but it wasn't. A way was selected, and it turned out to be a good way, and we are where we are.

Therefore I associate myself with all the remarks that General Glasser has made about this, about the effect on the morale of the peo-

ple and so on, and I feel that one of two things must happen.

We must recognize this as a proper element of our structure and give these people a feeling of security, a feeling of recognition, or else we need to identify what is wrong with doing business this way, and select some better way, and then develop a plan to get to that better way, and recognize that it will take a significant period of time, years.

I would not say that this is the only way in the world that the job can be done, but I would say that it is the only way that the job can be done now and in the near future, and if we want another way, let's be sure that it really is a better way, and have an orderly plan to get

there.

I know from conversations that I have had with the chairmen of the boards of each of the FCRC's that the Air Force deals with that they share my feelings in this regard. They want to serve the country in a proper way, and if there is a better way, they would like to seek that.

The way we are doing it is a good way. It is essential. It serves our needs now, and if it is wrong we would like to better understand what

it is that is wrong about it.

Senator MURPHY. I thank you very much. I intend to pursue this because I think that certainly the intent of this committee was misrepresented in some areas.

I think it would be presumptuous of me to criticize the Presidential directive, but I have been around town long enough to know that when you keep hearing "the White House says," the White House has many rooms, and it is important to know which room is speaking.

I think that this is an extremely important matter, and I am going to pursue it. I am glad that your testimony fits in with what my instinct has been—that there has been a misunderstanding, and that

irreparable damage might be the result of misinformation.

I agree that there may be better ways, but I also think that if there are better ways, we should find them first. Until we find a better table, let's use this one, and test the other one before we destroy this one.

The other day, Mr. Chairman, I came across records of a meeting which I did not know had taken place some months ago at one of the outstanding universities. There was an attempt to encourage the cessation of all research and development that has to do with the military.

Under the present world conditions, and until we can see some streaks of light in the future that look better than any I have been able to understand, I think this would be the most destructive thing that possibly could happen.

think that our only answer at the present time is our research and development, our scientific capability, coupled with the industrial

capability of manufacturing.

I have no more questions, Mr. Chairman. Thank you very much, Mr. Secretary. Thank you, General.

COMMITTEE PROCEDURE

Senator McIntyre. Thank you, Senator Murphy. I want to amend what I said at the beginning of the hearings. We will return at 2:30, not 2 o'clock, as I had stated, because I was unaware that all previous notices had indicated 2:30.

Senator MURPHY. Mr. Chairman, I would like the record to show if I may that the schedule that we are operating under now in the Senate is just impossible. I would like to spend my entire time here, but at 2:30 there is a most important meeting of the Education Committee, so I can't be here.

It will not be possible for me to be here, but I would like the Chair to know and these gentlemen to know that it is not any lack of interest.

Senator McIntyre. May I suggest if you are free around 5 o'clock you come back because I have the feeling we will still be here.

Senator Thurmond.

MINUTEMAN SURVIVABILITY

Senator Thurmond. General Glasser, based on what you know at this point, would it be as effective or economical to defend MINUTE-MAN with the Air Force proposed hard point defense system as opposed to SAFEGUARD?

General GLASSER. That is a pretty difficult question for me to answer sitting here, Senator Thurmond. We have looked at a number of ways of enhancing the inplace survivability of the MINUTEMAN and the hard point defense does appear to us to be a very attractive one.

It is entirely conceivable that, by the time we shake all of this out and know all of the factors, it will turn out that the hard point defense is a very complementary system because it operates right at the silo being defended, and for those RV's that do come through the SAFE-GUARD coverage there is a last-ditch defense there. I have to be fairly evasive on this because I don't have a hard and specific answer at this time.

Senator Thurmond. Of course, the ABM SAFEGUARD would not only give protection to the missiles, but if it covered an area it would also give protection to population.

General Glasser. That is one of its assets, yes, sir.

Senator Thurmond. Of the \$77 million you are requesting to study MINUTEMAN survivability, how much are you applying to each of the four areas of study?

General GLASSER. If I may have a moment, sir, to break this out-

one moment, please. Let me try this again if I may, sir.

Of the \$77 million the subcategories would be for the command and control, that is integration of the buffer system into the MINUTE-MAN [deleted] million; for the hardening of the existing silos, it would be [deleted] million; and for new concepts which include things like you mentioned here on hard point defense, and so forth, we would have [deleted] million.

Senator Thurmond. Has any consideration been given to using the

Army's SAM-D for MINUTEMAN defense?

General Glasser. SAM-D? Senator Thurmond. Yes.

General GLASSER. Not that I am aware of, sir, no. I will examine further to see if that was earlier included in studies that I am not informed on, and submit if there have been.

Senator Thurmond. Would you place that in the record?

General GLASSER. Yes, sir; I will.

Senator Thurmond. If there is any alteration in your statement.

General Glasser. Yes, sir.

(The information follows:)

The Air Force has not studied use of the SAM-D but the Army has considered its use in their recently completed Hard Point Defense studies directed by Mr. William Davis (Army Ballistic Missile Defense Agency). It is our understanding that they concluded that a [deleted] type defense system is [deleted].

AGILE VERSUS AIM-82A

Senator Thurmond. General, when will the decision be made between the Air Force AIM-82A air-to-air missile and the Navy's AGILE air-to-air missile?

Mr. Hansen. That program is proceeding on a parallel basis with Air Force effort and Navy effort. The Navy effort is primarily inhouse. The Air Force effort is primarily with contractors. That is scheduled for July to be brought to Secretary Packard's office for a resolution as to how we will proceed further beyond July.

Senator Thurmond. What does AIM-82A stand for, for the record?

General Glasser. Airborne interceptor missile.

Senator Thurmond. General, if the Secretary of Defense selects the Navy AGILE missile later this year, what are you going to do with the \$37 million you are requesting for the AIM-82A in fiscal year 1971?

General Glasser. If that were to be the decision—and I think that is not the way the decision would go directly, but if that were the case—it would be as a consequence of a joint program between the Air Force and the Navy, and we would have to make a contribution of funding

to that.

The present situation is that the Air Force and the Navy are working very closely together to come out with a common missile that will take care of both the F-15 and the F-14, and our aggregate funds will be required for whichever of the approaches is ultimately selected.

Senator Thurmond. Secretary Packard said earlier this year the selection would be made between the Air Force and Navy missiles with fiscal 1970 funds.

General Glasser. Yes, sir.

ESTIMATED COST OF AIM-82A

Senator Thurmond. General, the Tactical Air Subcommittee earlier this year received a production estimate of \$20,000 to \$30,000 each for a [deleted] missile buy for the AIM-82A. Considering this missile will be extremely complex, do you feel this estimate is realistic?

General GLASSER. Well, it is as good an estimate as we are able to make at this time. It has been made in the more recent environment of what I might call fiscal responsibility, so I believe it is a reasonably accurate statement, subject of course to the normal causes, such as inflation, that could raise its apparent dollar value.

IMPORTANCE OF R. & D. PROGRAM

Senator Thurmond. I have a few questions here for the Secretary. Secretary Hansen, in your opinion, how important is the present independent research and development program, R. & D., to the security of our country?

Mr. Hansen. I think the present program is extremely important to the security of our country. I believe that is as essential to the sur-

vival of our high technology industries.

I believe that for those that are satisfied to build buggy whips as long as they are necessary and go out of business when something new comes along, they don't need to have their independent research, but I think that for those companies that depend on a high technological capability to survive in a competitive environment, and that expect their companies to go on in business indefinitely, it is absolutely essential.

In turn the country is dependent upon the contribution of those high technology companies for the survival of the country. I think it is absolutely mandatory.

EXAMPLES OF RESEARCH DEVELOPMENT

Senator Thurmond. Mr. Hansen, can you give us some examples of important defense developments which have resulted directly from the

I.R. & D. program?

Mr. HANSEN. I would like perhaps to augment what I can take off the top of my head for the record, but I think, for instance, of the transistor which has certainly revolutionized electronics in our lifetime, and which started largely in independent research done by a number of companies, most predominantly the Bell Telephone Laboratories.

Another example, the REDEYE program of the Pomona Division of General Dynamics had its origin in an I.R. & D. project there. I am sure that there are many examples.

Senator Thurmond. Would you like to insert others in the record

at this point?

Mr. Hansen. Yes, sir; I would like to.

Senator Thurmond. If there is no objection, Mr. Chairman?

Senator McIntyre. Without objection, that will be received for the record.

(The information follows:)

There are numerous examples of important developments which have resulted from IR&D. Each year DDR&E publishes "The Green Book" which is a compilation of examples of IR&D considered by industry to be beneficial to the Department of Defense. The latest edition is dated 24 February 1969. It is 1½ inches thick and classified SECRET. In addition, it contains information that is considered proprietary to the originators. Anyone who has any doubt about IR&D should review these documents in detail. The following are but a few examples from the many available:

Radioisotope—Heat Source Technology Space Power Systems. Since 1961 one contractor has been developing in IR&D, containment capsules for radioisotope heat sources. The capsules must be compatible not only with isotope but with the reentry environment including heating and impact. In case of an aborted mission, the capsule must confine the isotope so that it does not become a safety hazard. IR&D expenditures over the six year period have been approximately \$225,000 which included application to propulsion and electrical power generation as well as to the capsule development itself.

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As a result of a unique vented capsule design accomplished in IR&D, an AEC award for \$498K was made for further development. Performance period was April 1969-February 1970. Research results of the heat source technology program was largely responsible for the award for the TRANSIT Navigation Satellite. The award is for \$10,619,000 over 21/2 years beginning in January 1969.

This is an example where AEC used technology developed under IR&D which

was not funded through AEC's contracted IR&D efforts.

Surface Coatings IR&D. A program of coating evaluation has been maintained for many years. This includes both plating, diffusion coating, and plasma spray types. In recent years the program has included evaluation of low cycle and thermal fatigue characteristics of parent metal and coating combinations. A substantial amount of data on these advanced combinations has been developed and, in addition, laboratory level specimen preparation and testing techniques have been developed which provide a relatively low cost and short time prediction and verification mechanism with respect to characteristics which might exist in the actual engine component.

Recently one contractor submitted a Value Engineering Charge Proposal for overhaul of engines, proposing a salvage procedure for the low pressure compressor-turbine shafts which are subject to pitting in service. The data base referred to above was important in stimulating the idea of the salvage procedure for this part and provided us with confidence that the resulting refurbished part would be up to a new part in service. A modest special test was conducted to verify our expectation under the simulated environment for this engine. As a result of these tests and the background information, Air Force technical approval was obtained. This resulted in an acknowledged cost savings to the Government of \$5,700,000 and a Value Engineering award to the contractor.

In the above example, our low cycle and thermal fatigue program had not been

constructed in anticipation of this application of results.

Advanced Arming and Fuzing. As a result of continuing development in bomb fuzes a simple injection molded plastic fuze was developed to replace the conventional eleven part metal unit. This was documented by Value Engineers as resulting in a savings of \$1 million to the government. This development was initially funded under IR&D funds amounting to \$25,000.

Vibration IR&D. The objectives of this program were to investigate the parameters that affect the critical speeds of multi-shaft engines, to develop calculation methods for predicting vibration frequencies, and to experimentally verify the prediction techniques. The program was subsequently supported under other sponsorship and was expanded to include an investigation of the oil squeeze film damper as a means of controlling rotor vibration.

The significance of this effort lies in the fact that with the advent of high speed, multi-mission, multi-shaft, high thrust to weight ratio gas turbine engines, the problem of avoiding serious shaft vibrations associated with critical

speeds has become increasingly difficult.

Criteria were established for design of the squeeze film damper, and test results confirmed the effectiveness of the damper in controlling the effects of critical speed. The technology has been successfully used to eliminate vibration problems encountered with a compressor test rig. a fan test rig and a demonstrator engine on the Lift Cruise Propulsion System. It was also used successfully in eliminating the vibration problems with the Single Roto Test Rig. These specific applications were not anticipated when we started the IR&D project.

The squeeze film damper will find application to design of lightweight, multipurpose engines where control of vibration by other means imposes severe weight penalties. It will provide the design flexibility which will permit reduction in the number of bearings and related supporting structure and result in a lighter, less complex engine with greater inherent reliability. It should also reduce development time and cost by permitting rapid correction of rotor vibration problems when they occur. Future savings to the Government in both time and cost will be substantial.

A.1R-34 Countermeasures Receiving Set Inoperation-Used on F-111. A project initiated in 1959 under IR&D funding was in response to a requirement for a missile launch detection system for the B-52. It is of interest that the government funded programs have not been wholly successful while the IR&D system led to the ALR-23 (now AAR-34) via government funding of a Tracking-While Scan System from 1960-1963. Currently all operational F-111 aircraft use this system which has made or exceeded all performance specifications.

Low Light T.V. Camera. The Low Light, F.P.S. Vidicon Camera was developed with IR&D funds. It possesses unique characteristics which suit it to gunship applications and greatly enhance the fire control capability of this aircraft system.

Forward Looking Ground Mapping Radar. A Moving Target Indicator (MTI) was developed with IR&D funds which will be used with the ATQ-113 radar. This MTI/ATQ-113 will improve performance by 75% over the present Mark II

System used in the F-111 and will have 1/4 the cost.

LORAN D. In 1966, the Air Force had an advanced development program to produce 17 sets of ARM 75 (LORAN D) and ground terminal. When it came time to go into production the contractor wanted \$152K but refused to guarantee the reliability requirements of mean time between failure. Two other contractors were able to pick up the contract based upon their IR&D effort and produced 295 equivalent sets for \$114K. This amounted to a savings of over \$11M. In addition to the above, three other companies are also working on LORAN, each with a slightly different approach. Some are emphasing receivers and computers; others, large scale integration; others, median scale integration: and others, are emphasizing weapons delivery aspects. This variety of approaches gives us several options to use in solving problems and as shown above the competition will tend to keep the price down.

Electrode-Electro Catalyst Project Oxygen Evaluation Catalyst Development. Investigations were undertaken in IR&D to improve the catalyst activity of oxygen electrodes operating in an acidic environment. Historically these electrodes were inefficient and not well suited for use in electro-chemical devices that produced oxygen (electrolysis units or oxygen purifiers). Approximately \$50,000

was spent between May 1968 and July 1969.

This work has resulted in the development of oxygen electrodes which operate at 90% efficiency rather than 67%. Thus, for electrolysis units (oxygen purifiers)

a net power savings of 25% is achieved.

These electrodes have been incorporated in hardware being developed for the Air Force. In addition, the same electrodes will be used in the fabrication of electrolysis hardware to be developed for NASA.

CIVILIAN APPLICATION

Senator Thurmond. Mr. Secretary, do you know of any important research discoveries from I.R. & D. which have had an important civilian application?

Mr. Hansen. Oh, yes. The transistor that I just mentioned has had perhaps as much impact on the civilian as on the military, and I am

sure that there are also many others in that area.

Senator Thurmond. Without objection, if you would insert others at this point in the record.

Mr. Hansen. Yes, sir; I would be pleased to do that, Senator.

(The information follows:)

Electron Beam welding IR4D. One of our contractors pioneered in the application of Electron Beam Welding of major jet engine components. Of major significance was the development of the Electron Beam welded compressor drum rotor in which individual stages are welded together, after finish machining and heat treat, without distortion. This type of construction results in a more rigid motor which permits the use of fewer bearings and lighter supporting structure, and results in a simpler, lighter, and more reliable engine. Furthermore, the aerodynamic configuration at the rotor blade root is improved resulting in an increase in compressor efficiency. This type of construction was first used by us in an actual application several years ago and in a lift-cruise engine program as well. Since the withdrawal of the original developer from full scale engine development competition, this technology has been described to the major engine primes, and this type of construction is now showing up in advanced engine configurations.

Laser Program. Laser research and development have been actively pursued under IR&D projects since we developed the first "ruby" laser in 1960. Under our quantum electronics and theoretical studies, IR&D projects, we have con-

tinued to discover other laser principles, devices and applications. Theoretical studies of laser output resulted in the invention of the giant pulse laser principle and the subsequent experimental demonstration in 1961. In 1964, we discovered the Argon Gas Ion Laser and rapidly thereafter uncovered hundreds of new laser wave lengths from ions of noble gases. IR&D expenditures for research and development of laser and laser materials is approximately one half million dollars annual. Benefit from this program is primarily technological advancement. Lasers in general have made it possible to perform experiments and functions previously impossible. In particular, the ruby laser in its giant pulse form and the giant pulse principle applied to other solid state lasers have made possible precise range finder systems. Based on this research and research on ion lasers, applications now being tested include scientific instrumentation, laser wide-band communication, satellite tracking, airborne bomb delivery systems, tank and infantry fire control systems, precision range finders, night reconnaissance systems, micro electric fabrication laser welding, and stop action and three dimensional photography. RDT&E government contracts on the basis of these IR&D programs include the laser bomb system, helicopter laser ranging subsystem, the M-60, A-1, E-1, tank laser range finder and the project 605A and 1593 laser line scanner development contract.

Civilian applications of the laser include surveying, mining, eye surgery,

hardening of tooth enamel, and etching of electronic microcircuits.

Biomedical Instrumentation. A program was begun in 1968 to identify and explore new approaches to the automation on medical microbiological surveillance and diagnostic systems. The immediate benefit to the government will accrue as a result of the development of automated test systems for a number of parasitic diseases. An even more important potential benefit is the advancement of technology that will result from investigations in the purification of antigens and the preparation of antigens from new sources. The fundamental information necessary to complete these studies will have wide applicability in the fields of personnel health, biological warfare detection, and basic micro-

biological research.

Air Pollution. An IR&D program was initiated to develop electrochemical sensors for monitoring atmospheric pollutants. The sensor element of the monitor is a faradaic device functioning as an electrochemical transducer. Operating similar to a fuel cell, pollutant molecules are absorbed at a sensing electrode and are either electro-oxidited or electro-reduced, resulting in a current directly proportional to the pollutant concentration. The IR&D effort resulted in the development of a direct reading, portable, simple to operate monitor for SO₂ NO, and NO₂, with feasibility demonstrated for monitoring other pollutants. The sensors show no response to water, which is a decided advantage over the infrared analyzer commonly used. Feasibility has been demonstrated for developing sensors for vehicle emission monitors and for hydrogen sulphide, mercaptons, and ammonia for stack emission applications.

Methods for Increasing Cutting Tool Life. This IR&D project objective was to develop an economical surface treatment of carbide cutting tools which will increase tool life by retarding the mechanism of failure by chip welding and oxidation. The program has so far produced two types of treated cutting tools which outperform standard tools in terms of tool life. Production tests of these

tools show cutting life to be increased by a factor of ten.

There are hundreds of other excellent examples documented in the DOD annual "Green Book." I encourage this committee to review them in detail.

EFFECT OF STUDENT PROTESTS ON DEFENSE PROGRAM

Senator Thurmond. Mr. Secretary, do you feel the student attacks on university research centers will eventually result in the loss of valuable studies on our defense needs?

Mr. Hansen. In all these universities we do have competent, dedicated people who do want to make a contribution to the defense capability of the country, and I think that as long as their voices are heard, we have nothing to fear. If a few dissident students can cause enough noise to overcome what I believe is the opinion of the majority of the people, then we would have a problem.

I look to the administration and the faculties and the public to view minority dissidence in the framework from which it comes. I believe that the university relationship with the Defense Department is a very important one, and I would hope that we don't anything which would handicap those people on the university campuses who would agree with what I just said.

Senator Thurmond. Are you optimistic then about the situation, or do you feel that it is a hazardous condition that will have to be

corrected?

Mr. Hansen. I think it is certainly something that has to be watched, but I believe that as long as there is a sensible majority, even though it is relatively silent, I think that their views in the long run will prevail. I think all of us have to be very watchful and very tolerant and very patient.

It is my personal belief that while it bears watching, it will run its course. I think the sound principle that people in the academic environment need to cooperate in all areas of national concern including

defense will prevail in the long run.

Senator Thurmond. Is it your opinion that these dissidents that you speak of constitute a small militant arrogant group, and that the great majority of the students are all right?

Mr. HANSEN. Yes, sir; that is my opinion.

Senator Thurmond. Mr. Secretary, from your experience do you feel that this student pressure is driving competent and expert scientists out of this work?

Mr. Hansen. I think that there is pressure in that direction. I can't

specifically think of anyone that has been driven out.

I think, for instance, of Dr. Draper who has certainly been harassed and his determination to continue to contribute in the ways that he feels he is capable of contributing is stronger than ever.

I think that it makes it very difficult for people to do jobs which they ought to be able to do easily. The academic environment is strong on the principle of academic freedom, and I think academic freedom should be extended to all.

To me that says that those who want to make a contribution to the defense of our Nation can, and those who don't cannot, and they ought

to go each his own way and be ableto do that unmolested.

To my specific knowledge I don't know of anyone who does have an interest in the defense of our Nation who has been driven out. Those I know are more encouraged to dig in their heels than to be driven out.

Now I am concerned as I said in my statement, that the younger people who did not get a start in concern about national defense because they have been born and raised in an environment in which the defense capability of this country have kept them safe and secure, and they don't appreciate it, they are not going into the universities and the research work that relates to defense, and that worries me.

Most of the people who do defense research work are old enough that they remember World War II. Many of them are veterans. The young people are not coming into this activity in the way that they should, and that is a matter of concern for me, and I think should be a matter

of concern for all of us.

ENTRANCE OF YOUTH INTO RESEARCH WORK

Senator Thurmond. Do you know of anything that can be done to encourage more young people to come into this research work?

Mr. HANSEN. I believe, yes; I think there is something that can be done, but I think it is a part of the overall problem of reestablishing the general understanding on the part of the country that defense is a legitimate part of the national program, and that participation in taking care of that legitimate part is not a dishonorable thing. It is an

honorable thing.

This does not come about easily. We all know some of the pressures that have helped cause the situation with the young people, a war which they don't understand or approve of, the situation with the draft and the uncertainties that that causes in their personal lives, and so turns them on. What it takes to turn them off I think is their continuing maturity and our continuing effort to make them understand the total picture that they are part of, to yield to their legitimate demands for change, and to dig in our heels hard for all of those demands that we don't think are legitimate.

Senator Thurmond. Do you feel that as they become more mature and as they visualize to a greater extent the challenge the Soviet world is making to freedom, and the importance of protecting our country through important research, that this might in itself encourage more

of them to go into research?

Mr. Hansen. I would certainly hope so. I know a specific example. A very good friend of mine was quite concerned because his daughter married a fellow with a beard and beads who generally refused to wear shoes and things like that. A few years have gone by now, and they have a couple of children, and he says it is amazing how conservative he has gotten in the last few years.

He has changed his point of view quite a bit about what ought to take place on campus, and what ought to take place in the Nation as a whole, and I think that may be true in many cases. I am sure it is part

of the national development of young people.

Senator Thurmond. I want to thank you, Mr. Secretary, and General Glasser for your testimony.

Mr. Chairman, thank you.

PURPOSE OF UNOBLIGATED FUND

Senator McIntyre. Thank you, Senator Thurmond.

Secretary Hansen, you are requesting that \$18 million of estimated unobligated funds from fiscal year 1970 and prior year R. & D. programs be reauthorized. Can you explain what programs comprise these \$18 million?

Why should these funds, which will not have been obligated for 2 or more years after being authorized and appropriated, not be used to support your fiscal year 1971 program instead of being reauthorized?

Mr. Hansen. I would like to ask General Pitts to answer that ques-

tion if I may, Mr. Chairman.

Senator McIntyre. General Pitts, glad to see you here.

General Pitts. Thank you, sir. Mr. Chairman, in direct answer to your first question, we are not able this time to identify specific items in prior years that are in those amounts proposed for rescission.

As you are well aware, the Department of Defense Appropriation Act of 1970 was passed pretty late in the year, December 29, I believe to be the exact date.

Senator McIntyre. Is that right?

General Prrrs. Yes, sir, December 29, 1969, and we were required to have our 1971 budget over to the Bureau of the Budget my mid-January. As a result there was a very, very short period of time to comply with the wishes of Congress in identifying these amounts for rescission.

I would say in further answer that this is a nebulous area. We derive from experience these amounts we know are in those programs in past years. Historical experience tells that these balances are there,

but we cannot at this time identify specific programs.

We are reviewing this matter with Secretary Moot who spoke of this to Mr. Mahon's committee just recently, and after this review I would think it would be most helpful if we came over and discussed this further with the committees of Congress that we deal with.

Senator McIntyre. You are unable at this time then to provide the programs that comprise the \$18 million because it is as you say too

nebulous?

General Prrs. No, sir; just some of the reasons which will cause the unobligated balances. Those areas include such items as contingent legal liability obligation adjustments, cost increases when no change in scope of projects occur, court awards, military interdepartmental purchase requests—where we buy things through other services, Army or Navy, and there are sometimes delays in putting those moneys on contract—and things of this nature.

Senator McIntyre. Will you have those for us later for the record? General Pitts. Yes, sir; I will expand on that for the record.

(The information follows:)

At this time it is not possible to identify the specific items which will be unobligated on June 30, 1971. However, based on prior experience, estimated obligations totaling \$18.0 million to complete prior programs will be required due to the following:

Contingent legal liability obligation adjustments.

Cost increases when no change in scope of projects occurs.

Court awards.

Certain research and development project expenses which can only be obligated when incurred.

Engineering changes.

Funds held awaiting final audit required to close out contract.

Delay in final acceptance of hardware.

Late submission of final invoices by contractor.

Pending claims.

The Research, Development, Test and Evaluation program is characteristically dynamic. It consists of many technical systems, programs and projects which are subject to fluctuation as technological changes and advances occur. In addition, changes in operational requirements dictate changes in emphasis within the program, which require constant re-evaluation of the program and frequent reprogramming of funds. These factors combine to produce a level of unobligated balances as a normal carryover at the end of the fiscal year.

The actual and estimated unobligated balances shown in the budget do not represent a planned unobligated balance in the sense that specific line items or projects included in the budget are not planned for obligation in those years. The unobligated balances are required to complete the financing of the Research, Development, Test, and Evaluation program because all technical programs and projects are programmed for accomplishment with the full use of these funds. By estimating an unobligated balance, cognizance is taken of the many factors

that inhibit prompt and orderly obligation. It should be noted that the estimated unobligated balance reflects the amount that can reasonably be expected to remain unobligated on an appropriation-wide basis due to normal operating conditions. The balance is not estimated on a project-by-project basis.

Senator McInter. The second part of the question there, the thrust of your answer seems to be the situation you were put in by the lateness of the decision on the defense budget. That has to do with not being obligated.

General Pirrs. No, sir. That had to do with our not being able to

identify those programs in our estimates.

Senator McIntyre. And you take the position that they should not be used to support your fiscal 1971, but instead should be reauthorized?

General Pirrs. Yes, sir.

Senator McIntyre. Thank you, General.

General Prrrs. Yes, sir.

MOL PROGRAM TERMINATION

Senator McIntyre. Last year \$125 million, Mr. Secretary, was paid to cover the cost of winding up the MOL program. How much of this amount has been used and is any of it available because it will not be needed for that purpose?

Mr. Hansen. I would like to start the answer to that question by stating that the termination of the MOL program is still proceeding, and will be continuing for at least another year to a year and a half.

I don't know the exact status.

UNOBLIGATED BALANCE

General Pirrs. As of January, Mr. Chairman, \$95.8 million of that \$125 million has been obligated. That leaves a balance of 29.2 unobligated.

Senator McIntyre. Is there any demand on that \$29.2 million.

General Pitts. Studies are under way at this time, and we will know probably by mid-April when and where the remainder of that money would be obligated as between contract termination charges on the MOL contract or as between allocation to future unmanned space programs, and I would ask General Glasser if—

Senator McIntyre. Just a minute, when you say future unmanned space programs, you mean if there is \$4 million left over, you will put the \$4 million in the new category of unmanned space programs?

General Prits. No, sir. If you will remember when the \$125 million was left on this program element it was to be divided between terminating the MOL contract and putting some efforts that were carried under the MOL program into unmanned programs. I will ask General Glasser to expand.

General GLASSER. Yes, sir. The guidance that we received was that these funds should be used for completing the termination of those things which were determined to be terminated, and for the exploitation of certain aspects of the program that appeared worth carrying

forward into the unmanned space program.

As has been indicated here, we have used up now some \$95 or \$96 million worth of these funds. Terminations characteristically take longer than this to settle out, so that we will be quite fortunate if by April we

are able to identify a precise breakout of what is going to be required. Termination proceedings are very slow and require considerable auditing of books, because we are closing out contracts and the moneys have to be reserved to be able to do that. It will be a while before we can say with precision how much of that money will be used for termination versus how much of it will be used for the other purposes for which it was authorized.

Senator McIntyre. You think April is an optimistic date?

General Glasser. I do, sir. We will do our best to meet that date,

but I tell you in candor that I believe it is optimistic.

Senator McIntyre. Should any of these funds be left over, is there any reason why some amounts cannot be reprogramed, any of this \$29.2 million?

General Glasser. I would be hesitant for the reasons that I mentioned to say that they would be at this time. I frankly doubt that they will be

Senator McIntyre. Your opinion is that the \$29 million or so will

all be utilized in following up the termination proceedings?

General Glasser. Yes, sir.

MILITARY RESEARCH PROGRAM

Senator McIntyre. Mr. Secretary, Dr. Foster stated before this committee recently that some benefit was being derived from the implementation of section 203 of the fiscal year 1970 Military Procurement Authorization Act, Public Law 91–121, which pertains to relevancy of the research program to the military.

He also said if this provision were not repeated in fiscal year 1971, he expected that the Department would continue to comply with its

principle. Do you agree with this opinion?

Mr. Hansen. Yes; I would agree with that as far as it goes. I would like to expand upon it if I may.

Senator McIntyre. Briefly.

Mr. Hansen. I agree that it is good for us to lean back occasionally

and take a harder look at what we are doing.

I agree that with respect to future years, the tightness of the funds put on us a priority requirement which pushes us toward the things of more readily foreseeable value, such that we would do what 203 forces us to do anyway simply because of fund limitations. I would add the caution that I made in my statement, that those things particularly in the basic research area which we are not doing must be picked up, and done by some other part of the country or the country will suffer.

I fear that if we create an environment in which researchers have to justify what they are doing by predicting what problem it will solve, we are going to suppress the innovative exploratory character of what people do, to the point where we may miss the type of important discoveries and developments that have occurred in the past and helped

to make our country great.

I simply think that if people have to justify in the research area they tend to become more and more conservative, and unless they can clearly foresee what problem they are trying to solve, they won't be able to get sponsorship, and some of the great discoveries will be missed, like penicillin I understand was kind of an accidental discovery. The guy

who was working on it was not able to answer "I am trying to discover

penicillin." He was working on some other problem.

That was the reason in my statement why I said that I think many of the significant developments have been sort of accidental in a sense. As long as we are working on good science that adds to the knowledge of our country, we are pushing in the right direction, and I think that should be encouraged. Those things which can't be done in the Department of Defense for budget or other reasons should be sponsored either in the National Science Foundation or one of the other departments of government, or private industry or some place or the country will suffer for that, in the long run.

SECTION 203 INTENT

Senator McIntyre. Mr. Secretary, there appears to be a misunderstanding on the part of the military services concerning congressional intent in enacting section 203. It was not intended to reduce the level of essential research, but rather to have nondefense agencies undertake that research which clearly has no direct or apparent relevancy to military requirements.

Don't you agree that if the budgets for those civilian agencies, such as the National Science Foundation, were increased concurrently, the Nation would be essentially in the same position as if the funds were

requested by the Department of Defense?

Mr. Hansen. Yes, sir, I agree with that. Senator McInter. People are getting pretty hardheaded over in the Pentagon. Our problem is one of trying to compete with the Senator who is saying "We think the research should be relevant to defense," and we just cannot stand up on the floor and win a vote, because the average Senator arriving on the floor says "Yes, it should be relevant"; and as we look through R.D.T. & E., we have only found a few areas involving this problem. One that came to our attention immediately was foreign aid research involving the State Department. Then the other day there was another indication, which involved the Department of Commerce pulling out of a joint R. & D. program on surface effects ships.

That is what beleaguers us who are defending this budget on the floor, so that we can't say to the individual "You are on the Commerce Committee. Why aren't you going forward with this on research and

development? Why do you let Defense pick up all these eggs?"

That is why I can understand what you are talking about when you start out on a program that may appear to be completely irrelevant, and all of a sudden you come up with an answer to some aerodynamic problem that is going to be a great achievement for the Air Force.

General Glasser. May I add a comment, Mr. Chairman, which I

think may be helpful in that regard?

I detect no opinion within the Defense Department that says that the Congress is pushing us around in the higher orders of research and development, the applied, advanced, and engineering development activities. Clearly they must be direct; they must be apparent; they must be relevant. The more difficult area is research, which by definition has not an apparent relevance depending on how you define "apparent," which is a relative word.

We must restrict research to those areas which historically developed things that have military utility; areas where we look around at the world's body of knowledge and say "it is deficient," and "there are things that need to be filled in and if they were filled in they probably

would be of military utility."

We try to restrict ourselves to those areas, but if someone then asks us "Show me the directness and show me the direct relevance of that piece of work" we are hard pressed to do so. I would hope that the Congress in reviewing this would have a scale of lenience, or a scale of discipline, depending on how you look at it so that in the research areas there would be an acceptance of this lack of total apparency. As we move up through the exploratory development and into advanced development and engineering development they should become increasingly rigorous by the time we reach operational development the relevance ought to be absolutely direct and absolutely apparent to everyone.

Senator McIntyre. Mr. Secretary, you mentioned that we are [deleted]. Can you explain how you know this, and what significance you

see in [deleted].

Mr. Hansen. The information that we have on Soviet activities [deleted] comes through various sources to the Defense Intelligence Agency. The information which I have on that subject comes from them.

As a matter of fact, I have their recent report which I received, which is even more alarming than these things that I mentioned in my statement. [Deleted.]

Also through the DIA sources we understand that [deleted.]

[Deleted] and it is alarming to me that the Russians are making that kind of progress.

We are also making good progress, but I believe that if I had more funds available, that is one of the place I would put them. I would encourage even more activity in the [deleted] than we have today.

We have General Gilbert, the director of our laboratories, and General Eddy, who is the commander of our research activity here. I might ask if either of them want to amplify on what I have just said. Do

either of you care to comment?

Senator McIntyre. Perhaps I can help a little bit by saying we are now talking about the significance of this intelligence, and ask you for a comparison of our capability with [deleted].

Mr. Hansen. No, [deleted].

Senator McIntyre. How many [deleted].

Mr. Hansen. [Deleted]. Our activity has been of the order of [deleted.]

Senator McIntyre. That would be how many times greater?

General Gilbert. Sir, we have produced devices in the United States upwards of [deleted.] We have not achieved that as of this time.

Mr. Hansen. We don't have [deleted.]

Senator McIntyre. Is that at a scientific meeting of some standing? Mr. Hansen. Yes. I understand that it was in a scientific meeting. Senator McIntyre. Of some standing?

Mr. Hansen. Of some standing.

PARITY OF DEVELOPMENT WITH SOVIETS

Senator McIntyre. Mr. Secretary, do we not have the perception to recognize such significant potential discoveries by the Soviets and the resources to accelerate our own efforts in those areas at the expense of lower priority requirements in order to overtake them? Can't we perceive these things where they may be moving ahead, and reorder ourselves on our priorities, and begin to match them or catch up with them.

Mr. Hansen. Not completely because theirs is such a secret and closed society that our visibility is very limited, and therefore we have to address ourselves more to what we think they might be doing than to what we know for a fact that they are doing.

General Glasser. May I comment on that too, Senator?

Senator McIntyre. Yes, General.

General GLASSER. There are several areas, of which this is merely one, where these things become more of an art than they are a science. The individual who has had the years of experience with it can make great progress, and people can see what he is doing and go to these scientific meetings and hear about it and still not be able to reproduce it without a considerable amount of effort.

If you think back over the years, some of the things like the liquid hydrogen work that went on, and things of that sort, are examples. There are people in France who make optical glass and people in Germany who make optical glass that we are not able to reproduce. We buy the stuff regularly, we know what it is but we are not able to reproduce it.

I think the moral of this is that there are certain areas where you just have to be in on the ground floor and you can't just read a maga-

zine and say "I will do that same thing."

Senator McIntyre. The thrust of the question was simply if along comes some definite intelligence indicating a Soviet breakthrough, and this of course is like the SPUTNIK in the instance back in the fifties, don't we have the perception to recognize a breakthrough and to reorder our priorities and get about the business of catching up? I think we do.

General Glasser. The point I was trying to make is that we can't be totally successful in a reactive environment. We have to busy ourselves years in advance of developing a sound base of fundamental technology, so that when we do see a breakthrough come in, we have people who are able to exploit it. If we wait until the breakthrough arrives, we probably haven't had the people with the fundamental technology background that can tell us what to do now.

Mr. HANSEN. And even granting the point that you make, which I believe is correct, there is a timelag, and that timelag is a period in

which our risk is increased.

We see that even with something like the atomic bomb we only had a monopoly on that for a relatively short period of time, I think that most any development in time will be picked up by other countries, and the superiority in a technological way of a particular country is getting it in hand first and exploiting it during that perishable period that it takes someone else to catch up.

FUND SAVING THROUGH PROGRAM INTEGRATION

Senator McIntyre. Mr. Secretary, will the integration of the Office of Aerospace Research into the Air Force Systems Command result in any savings of manpower and funds?

Mr. Hansen. This change was not made for the purpose of saving manpower and funds. To some extent it has been forced by the re-

quirements to save manpower.

The 703 exercise that we went through last year, and the exercise that we have gone through to construct this budget, the fiscal 1971

budget, anticipates that this consolidation will happen.

Now specifically the answer to your question, yes; there will be a saving in doing it that way over keeping them separate, because some of the administrative functions can be combined. There will be a small saving. That saving has already been taken into account, and that was not the primary reason for making the change.

The primary reason for making the change was to make an organizational provision which we thought would help us to assure on a continuing basis the direct and apparent relevance of the research work which we do to the missions and operations of the Air Force as reflected in the activity of the Air Force Systems Command.

Senator McIntyre. I take your answer to mean that there will be

some saving in manpower and small saving in funds.

Mr. Hansen. That is correct.

Senator McIntyre. How small, or are you not prepared to say?

General GILBERT. Perhaps on the order of 20 people or so in the consolidation, maybe 30. We have a planning group at the present time that is looking into that specific question, and it will essentially be the salaries of the civilians and the military associated with those small savings in manpower.

General Pitts. Mr. Senator, I might just expand on that by saying

those savings will accrue mainly in the 1971 time frame.

Senator McIntyre. Such savings as they are.

General Pitts. Yes, sir.

LIST OF SALARIES EXEMPTED

Senator McIntyre. Mr. Secretary, will you provide a list of the eight individuals and salaries for whom you have recommended that exceptions be granted for salaries in excess of \$45,000 pursuant to section 407 of Public Law 91-121? Will you also list the other nine for whom you are not recommending an exception, and show their salaries before and after the reductions?

Mr. Hansen. You want that for the record?

Senator McIntyre. For the record.

(The information follows:)

	1969 compensation	1970 recommended compensation
Aerospace Corp.:		
President (I. A. Gettine)	\$90,000	\$70,000
Senior vice president-technical (A, F, Donovan)	66,000	55, 000
Senior vice president—development (E. H. Krause)	65, 000	53, 000
Vice president and general manager-systems engineer operations (B, P, Leonard).	58, 000	50,000
Vice president and operations general manager, San Bernadino (W. B. Brewer)	55, 000	50, 000
Mitre Corp.: President (R. R. Everett)	60, 000	60, 000
RAND Corp.:		60.000
President (H.S. Rowan)	1 68, 250	60,000
Vice president-administration (J. R. Goldstein)	1 60, 900	51,000

¹ Includes Sabbatic pay.

Subsequent to the approval by OSD of the above Air Force recommendations, RAND and Aerospace indicated their intention of not requesting reimbursement from the Government for compensation in excess of \$45,000. It should be noted that they plan, in varying degrees, to provide from non-federal sources any compensation in excess of the federal reimbursement. Therefore, it appears that only one executive in an Air Force FCRC (MITRE), will be approved pursuant to Section 407, to receive compensation from Federal funds over \$45,000.

Exceptions not recommended. Reimbursement from Federal funds limited to \$45,000

Aerospace Corporation: com	1969 ponsation
Vice president & operations general manager engineer science opera- tions (A. Mager)	\$50,000
Vice president & association general manager systems engineer oper- ations (D. A. Dooley)	50, 000
Vice president & general manager for satellite systems division, systems engineer operations (W. F. Leverton)	50, 500
Vice president & general manager for manned systems (W. C. Williams)	50, 000
Vice president, administration and treasurer (W. W. Drake) Vice president and general manager laboratory operations (G. W.	45, 500
King)	45, 500
Lincoln Laboratory	
Director (M. U. Clauser)	48, 000
Rand Corporation:	
Vice president—(L. J. Henderson)	
Vice president, Research (B. W. Augenstein)	* 57, 750
•Includes sabbatic pay.	

SALARY STUDY

Senator McIntyre. Incidently you mentioned a study now underway by the FCRC's on this question of salary levels. Is the Air Force paying for this study?

Mr. Hansen. No. This study is being done at the direction of the Aerospace Corporation Board of Trustees, and is being paid for out of the corporate funds which the Aerospace Corporation has.

Senator McIntyre. The answer is that it is not being paid for by the

Air Force?

Mr. HANSEN. That is correct.

RECOMMENDED EXCEPTIONS

Senator McIntyre. Will you explain why you recommended ex-

ceptions for those eight, in general?

Mr. Hansen. Yes. We made an analysis of all of the available information which we had on the present salaries in the laboratories of the Atomic Energy Commission, in the private nonprofit corporations around the country such as Battelle, the Stanford Research Institute and so on, and from executive salary survey data that was available to us, and we made up some plots of prevailing salaries in relationship to types and levels of activities and from this data we developed relationships of those salaries and the activities, and drew from that then our conclusions as to what appropriate salary would be for the FCRC's based on their competition with the other activities for which we had data. Now we did not, in accordance with the directives that we have, make comparison with the private aerospace industry.

Senator McIntyre. If you want to make any additional explanation as to why you recommended these exceptions for the record, I would be happy to have them. I am going to ask a question, and I am going to do a very impolite thing. I am going to leave, but it will conclude the questions I have specifically for you, Mr. Secretary, but you can give the answer. There is a vote. At the conclusion of this

question, we will recess until 2:30.

With reference to your comments on R.D.T. & E. as it relates to the Vietnamization program, can you identify the specific projects, and amounts in your fiscal year 1970 and fiscal year 1971 programs for this purpose? Can you do that?

Mr. Hansen. Yes. May I supply that for the record? Senator McIntyre. All right.

(The information follows:)

In early December 1969, the Air Force initially estimated that approximately \$2 million of FY 70 funds for RDT&E activities were related to the Vienamization program. As planning progressed towards a realistic effective VNAF force structure, this estimate has increased to \$4.005 million. The projects are:

Palletized Gunships.—This project will provide for procurement, test and evaluation of an easily installed and removed palletized search/strike system for airlift aircraft possessed by the VNAF. The pallets would include a night observation device, [deleted], simple analog computer, sight, power supply and guns-[deleted]. This system will give the VNAF additional gunship capability at night while retaining the airframe for daylight airlift (\$300,000).

VNAF Job Performance Aids.—Objective of this effort is to improve the performance of an unsophisticated flight line technician on the job. Flight line maintenance booklets are scheduled to be available in August. Trouble shoot-

ing aids and line replacement guides are scheduled. Cost: \$2,000,000.

Study on the Conversion of USAF Equipment for Use by the VNAF.—This effort would specifically address the important point that we must consider the physical size of the Vietnamese as it relates to operating "Americanized" equipment. Some data has been gathered but we need to take a much more in-depth look at this time to identify future problems which will come up during the transition of equipment such as those modifications needed to optimize equipment for VNAF use (\$100,000).

Fuel Air Emplosive.—The Air Force 2800 pound BLU-76/B can be carried in

pairs on the A1E aircraft as well as on the USAF high speed fighter bomber aircraft. We feel that the BLU-76/B will provide the VNAF with an effective area weapon. We plan to procure a sufficient number of these bombs to conduct a com-

bat evaluation this fall (\$700,000).

Night Image Intensifier.—We are currently evaluating an improved device similar to the Starlight Scope currently being used in forward air control operations. We intend to investigate its utility in night surveillance and navigation from both VNAF fighter and forward air control aircraft in a fixed mounted, swivel mounted, or hand held method of operation (\$40,000).

Fuze Power Supply.—A charging device to arm a relatively inexpensive proximity fuze after the bomb has left the aircraft will make general purpose bombs with internal plumbing compatible with unused inventory Navy fuzes. Funds to

complete development, test and evaluation—\$90,000.

VNAF Tactical Air Reconnaissance Program.—This program will give RC-47 aircraft a night capability with real time target acquisition. It will allow VNAF to conduct operations now performed by RB-57 in III and IV Corps. Equipment has [deleted] which would detect camp fires and sampans. Interdiction will be

accomplished by artillery barrage as currently done. Cost: \$75,000.

A1E/G Improvement.—The application of low light level television to A1 type aircraft will provide a night capability. It updates Tropic Moon I which USAF tested in 1968 by use of a single zoom lens and improved TV capable for use with

flares. Cost: \$500,000.

Formatted Communications Equipment.—This is a family of communications gear for rapidly transmitting repetitive messages securely and efficiently. This equipment is simple, reliable, off-the-shelf, has short training time. Funds will be used to determine formats and integration of the gear into the present communi-

cation system. Cost: \$200,000.

The planning effort conducted to date has produced the list of R&D projects that appears above. These are identified for FY 1970 funds. The planning for FY 1971 is in a dynamic state and will be finalized during FY 1971. We will continue to exercise our contacts with the operational users and field planners to insure that new candidates meet their requirements. As new R&D candidates are proposed for Vietnamization, we will maintain close cooperation with DDR&E and identify the required FY 1971 funds.

COMMITTEE RECESS

Senator McIntyre. We will recess until 2:30. (Whereupon, at 12:30 p.m., the committee was recessed until 2:30 p.m., of the same day.)

(Afternoon Session, 2:45 O'clock, Thursday, March 12)

Present: Senator McIntyre.

Also present: Of the staff of the Committee on Armed Services: T. Edward Braswell, Jr., chief of staff, and Labre R. Garcia, professional staff member.

Of the staff of the Preparedness Investigating Subcommittee: James Kendall, Ed Kenney, Hyman Fine, David A. Littleton, and George Foster, professional staff members.

DEPARTMENT OF THE AIR FORCE

RESEARCH AND DEVELOPMENT

RESEARCH TITLE CHANGE

Senator McInter (presiding). The committee will come to order. I do not know how the voting is going to go on the floor. We will try to carry on but if it gets to a point of being ridiculous, I will probably ask you gentlemen to come back tomorrow afternoon at 2:30. Hopefully then the tide will have quieted down and we can at least enjoy an hour or two here while we try to answer some questions.

General Glasser, as a matter of interest, one of the first items that Chairman Stennis discussed with me a year or two ago was to find another name for research, development, testing, and evaluation, and in thumbing through in a magazine last night I see where you have a different name, defense requirements and developments, is that right?

STATEMENTS OF HON. GRANT L. HANSEN, ASSISTANT SECRETARY OF THE AIR FORCE (RESEARCH AND DEVELOPMENT), AND LT. GEN. OTTO J. GLASSER, DEPUTY CHIEF OF STAFF, RESEARCH AND DEVELOPMENT—Resumed

General Glasser. No, sir, that is a little bit out of context. What I was referring to there was my own organization, which is much more heavily involved in requirements, development, and acquisition than it is in classical research and development. That was the reference, but it is certainly germane to the conversation.

Senator McIntyre. I just thought if you really had something that you could sell to the Joint Chiefs, why I think that Chairman Stennis, would be happy to get away from that word "research."

General GLASSER. My horizons are limited, sir. I am only interested in changing the name of my own organization.

COMPLETION OF F-111 DEVELOPMENT PROGRAM

Senator McIntyre. All right, let's talk for a second about the F-111 and the FB-111. Your descriptive summaries indicate that beyond fiscal year 1971 no additional R.D.T. & E., funds will be needed for

the FB-111 and only \$16 million more for the F-111. Does this mean that these expenditures will mark completion of the development phase

of the F-111 family of aircraft?

General GLASSER. The reason for these funds is associated with the testing phases, and there will be no further R.D.T. & E. funds required beyond fiscal year 1972; so that does mark the completion of the development program.

EXPERIENCE GAINED

Senator McIntyre. What significant lessons have we learned from our F-111 development program experience that we may profit from

in the future for programs such as F-15A and B-1?

General Glasser. Well, there have been a variety of lessons learned. Let me see if I can recapture a few of them right off the top of my head. A very significant program in the Air Force that has resulted from our F-111 experience is what we call our aircraft structural integrity program. We have had, as you and the public well know a series of unfortunate incidents with the structures involved in that aircraft. Looking back over how we went about it, we have found that there are some things that we might have done better. As a result we have instituted within the Air Force a very widespread program which now will be incorporated in all of our new system programs like the B-1, and the F-15, the AX, and so forth. That is one lesson.

Another lesson that we have learned through our F-111 experience is that aircraft that are built for too many purposes, that is too much of a multipurpose airplane is not a good thing. In many cases single purpose airplanes are best, and if an aircraft is to be built for more

than one purpose, the purposes should be closely related.

I think another lesson that we have learned from the F-111 program is the degree of engagement that we should have between the using services and the contractor. For quite a number of years, you may recall, the military services were quite remote from the authoritative management of the F-111 program. I believe this operated to the disadvantage of the program. If I could I would like to extend this in the record.

Senator McIntyre. All right, for the record extend the answer. (The information follows:)

I might illustrate these and other lessons by some specifics concerning the F–15 and the $\rm B{\text -}1$:

1. The F-15 development and production contract was definitized and signed prior to release for development. The F-111 was begun with a letter contract.

2. The F-15 contract is a combination CPIF for development, FPIS for production. The F-111 was fixed price for development and this caused many problems associated with subsequent ECP's.

3. The F-15 has been set up with stringent ECP controls, where the total program need and impact of a suggested ECP will be thoroughly examined at the highest levels prior to approval. The established procedures should result in far less contract change orders than experienced with the F-111 to date.

4. The F-15 program began early competitive development of its highest risk subsystems well prior to release for development of the airframe (engines, radar, gun and Short Range Missile). These four systems also were developed competitively and will be selected in a "fly-off". The F-111 did not have this advantage in any area.

5. The F-15 is designed and has been rigidly restrained to a single purpose

aircraft.

6. Most of the comments on the F-15 also apply to the B-1. For example, the Engineering Development contracts for the B-1 system will be clearly definitized prior to release for development. The F-15 management techniques will be implemented in the B-1 Program. In addition, the Air Force has expended in excess of \$140M over the past five years on system studies and analyses and Advanced Development Programs in the areas of propulsion and avionics. The required technology developed thereby will enable the Air Force to proceed into B-1 Engineering Development with confidence.

SRAM PROGRAM BUDGET INCREASE

Senator MoIntyre. Recently, a reprograming action was approved by the Congress increasing the fiscal year 1970 SRAM program to \$84.7 million primarily to cover increased costs resulting from development problems. What confidence is there in the adequacy of the \$46 million requested for fiscal year 1971 and in the statement that only \$6 million will be needed after fiscal year 1971 to complete the development program?

General Glasser. Well, I would say there is quite high confidence in that. The \$9.6 million reprograming action restored the \$9.6 million which had been cut from the program during committee and confer-

ence action on the fiscal year 1970 program.

The principal reason for our asking for the restoration of that money at this time was that the R.D.T. & E. portion of that contract is all that remains of the fixed price total package procurement, and if we had not put that money on we would have allowed the contractor to claim default on the part of the government. Since he is believed to be over ceiling now, as are his subcontractors, it would have substantially exposed the Government and opened the contract. This was not a case of our having additional costs that occurred this year that surprised us.

These costs were anticipated last year.

Senator McIntyre. Although your total budget estimate is just slightly below your fiscal year 1970 program, a major increase is reflected and noted in your engineering development program largely at the expense of your operational systems developments. Are we to be encouraged by this trend which indicates that we are finally bringing major new weapon systems such as the F-15A out of our technology programs and nearer to operational use?

General GLASSER. I would say yes, sir, you have identified some of the major contributors to the increases in that program. Each year there is a shifting tide as aircraft or missiles that are in the engineering development programs are completed or moved toward completion. Some of the advanced development programs that are further along begin to expand and require more funds, and you are seeing that trend

at this time.

DETAILS OF APPROPRIATIONS SHIFT

Senator McInter. Page 5 of your justification book shows \$78.5 million transferred from other appropriations into the fiscal year 1969 R.D.T. & E. appropriation. Will you provide the details of these transfers for the record?

General GLASSER. Yes, sir. (The information follows:)

fin thousands of dollars

From	То	Amount
Other procurement Air Force	Other operational support SRAM Minuteman Traffic control and landing system	41,600 8,400
Total		78, 500

Senator McIntyre. You state that you have evidence which indicates that the Soviets have a prototype of a new aircraft with supersonic dash capability and intercontinental bomber performance characteristics. Can you elaborate on that?

General Glasser. I cannot elaborate on that at this time, sir. That

will have to be done in other circumstances.

(The information follows:)

Reliable reports indicate that the [deleted] has under development a variable geometry wing bomber which is somewhat [deleted]. Estimated characteristics of this aircraft are:

Gross weight	4
Fuel weight	ł
Payload (air-to-surface missile)	[Doloted 1
Maximum speed	[Deleted.]
Radius of action (high-altitude subsonic without in-flight refueling)_	
Radius of action (1 in-flight refueling))

This bomber could become operational in [deleted].

This aircraft would be capable of striking targets in the western U.S. on unrefueled two-way missions and in virtually the entire U.S. with one refueling.

RADAR DEVELOPMENT IN DEFENSE CAPABILITY

Senator McIntyre. On CONUS Air Defense, unless the AWACS, CONUS Over-the-Horizon Backscatter radar and CONUS Air Defense Interceptor are employed together, do we have a meaningful and effective air defense capability?

General Glasser. No, sir. In order to have a truly meaningful and effective air defense, we not only have to have the over the horizon radars, which as I indicated earlier take care of the northeast and northwest accesses and off the eastern and western coasts [deleted]

and this is expected to be handled by AWACS. [Deleted.]

However, it is entirely to be expected that with the onset of hostilities, the over the horizon radars will not long survive. At that point the AWACS, which have been on alert, will take off and take over their positions to fulfill their wartime surveillance role that had been previously performed as a peacetime role by the OTH radars.

In other words, this is an integrated whole that the OTH's, the AWACS and the interceptors must play together. Naturally, as parts of this system are lost, the system may be less efficient than it was, but certainly parts of it are better than nothing.

MODIFICATION OF F-14 AND F-15 TO INTERCEPTOR ROLE

Senator McIntyre. Even if as you say an airframe is approved in the near future and sufficient funds are provided, do you seriously believe, General, that such an improved interceptor could achieve an initial operational capability by fiscal year 1976?

General Glasser. We are looking at this time at an adaptation of the F-15 or possibly the F-14 to this role, and that is approximately when they would be available if the programs are successful.

Senator McIntyre. They won't be available in the time frame of

1976?

General Glasser. Yes, sir. Mr. Hansen. They could be.

General Glasser. They could be available. As I say we are studying them though they are not programed as CONUS interceptors at this time.

Senator McIntyre. Have you ruled out the F-106 and the SR-71? General Glasser. I presume you mean the F-12, sir, rather than the SR-71?

Senator McIntyre. Yes.

General Glasser. Yes, we have. As you know, the Air Force had for quite a while proposed the F-106X, and we have discovered, belatedly, that this is contrary to the will of the Congress, and we are moving out on other areas. The YF-12 we have now abandoned, including the tooling, and it will no longer be a reasonable alternative.

RESTRICTIONS IN CONTINENTAL AIR DEFENSE

Senator McInter. What degradation in continental air defense do we accept if we have only the operational AWACS and CONUS OTH radar, but not the interceptor?

General GLASSER. May I defer to Secretary Hansen?

Senator McIntyre. All right, Mr. Secretary.

Mr. Hansen. As General Glasser said before, in order to have the kind of air defense for the continental United States that we want we need all elements of the system. If we have the over-the-horizon radar and the AWACS, but only the continuation of our existing interceptors, we will at least be far better off than we are now, because we will get a sufficient amount of warning in time to allow us a better chance to position the interceptors where they will have a maximum chance of operating effectively. Thus, we are not without a system, but we don't have as good a system as we think we need, and would have, if we had the advanced interceptor. We would continue to use the present F-106s, for example, and there are plans to provide some improvements to them which would be considerably short of the look-down, shoot-down capability proposed for the F-106X.

Nevertheless the F-106 will be reasonably effective if it can be in the right place at the right time, vectored to that right place by the capability that the AWACS has to do a job of airborne command and control, and with the benefit of the early warning information.

Senator McIntyre. Is it true to say that in not having the interceptor we do accept a substantial degradation of this overall air de-

fense, continental air defense.

Mr. Hansen. Yes; that is true. Senator McIntyre. Substantial?

General Glasser. Yes, sir.

Senator McIntyre. Secretary Seamans in his statement to this committee, mentioned that the Air Force objective for the AX is a truly simple, inexpensive airplane. Your own statement also stresses simplicity. However, when you appeared previously, General, before

our research and development subcommittee, we were advised that the airplane would include in its original design provision to accommodate the necessary avionics to provide night and allweather capability. Can you do this and still call it a simple, inexpensive airplane?

General Glasser. Yes, sir; because what we referred to as provisions are the weight-carrying capacity, the volumetric capacity, and built-in wiring in the wings that will allow us at a later date to install the avionics for these capabilities that are not even invented at this time.

These will not contribute to the complication of the airplane but simply allow for the weight and space of air conditioning, heat, power,

and so forth.

Senator McIntyre. So you feel that even with this avionics pack it could still be called simple, inexpensive.

General GLASSER. We are confident of that, sir.

CHEYENNE AND AX PROGRAMS

Senator McIntyre. The Army Cheyenne assault helicopter is an existing system which has substantially been developed and tested, albeit with rotor control problems which we are told are near solution. If this can satisfy the close air support role for which the AX is being justified, why not drop the AX?

General Glasser. First of all, there are a series of comments that I must make on that, the first of which is the state of development of the Cheyenne. It has some development problems to be resolved, and we encourage the resolution of these. We think we should continue to

see how the Cheyenne will develop.

If it were fully developed and if it were to meet all of its design goals, we think it would fall short of some of the desirable character-

istics of a close support vehicle for the purpose described.

In this respect then the AX and the Cheyenne helicopter become either competitive or complementary as you choose to describe it. As I indicated to your committee, or subcommittee, for the cost of a Cheyenne it is our view, short of development proof, that a Huey Cobra with an AX is a much more cost effective solution to the problem.

With this in mind it is therefore our position that what should be done is conduct the development phase of each to see what they really could do and what they really cost, and then make the most pru-

dent production decision based on hard evidence.

Mr. Hansen. I would like to bring out the point of view that although the AX and the Cheyenne can both do a certain type of mission, there are many types of missions which one can do and the other one cannot. It is in that sense that we view these as being complementary. For example, the AX can't hide behind a tree or a hill and pop up and take a shot and go down again. The Cheyenne can do that. On the other hand, the AX has the payload, speed characteristics, and loiter capability to be able to do a number of close air support jobs and be relatively invulnerable at the same time.

The AX is specifically designed to make it as invulnerable as we know how. It makes use of armor, and has two engines. It will have all of those design features of redundancy that we know how to incorporate into an airplane to enable it to have a maximum probability

to do its mission and survive.

DELAY IN AX DEVELOPMENT

Senator McInter. Haven't I gotten the impression that the Air Force has been a little slow on that AX through the last 3 or 4 years? Haven't you been a little slow in coming along with this plane? It seems to me in prior meetings I have heard this discussed by other members of the committee, this problem which is so important to the infantry. This close support has been one role about which I have heard the Air Force criticized by senior members of this committee

in other years.

You know without any prior knowledge of the dispute or the talk that is already going on in the services, the other day when we had our subcommittee hearing, we first had the gun ship in the morning, and then in the afternoon we had the AX. I don't pretend to have any great knowledge or skill in these fields of all of the weapons systems, but even to an uninitiated, it was apparent that these two systems, weapons systems, were closing in on each other; and last night in the same magazine that I read about your new term for what I thought was R.D.T. & E. I read a little story which destroyed my idea that the helicopter is tremendously vulnerable. It showed that the helicopter, leaving out the distance that some of the fighter planes had to fly in the North Vietnam situation, had a very good record as far as vulnerability was concerned.

It cited cases of helicopters that had been downed five or six times and had 150 rounds of small ammunition or other ammunition in them.

I think this becomes quite an interesting area for this subcommittee of R.D.T. & E., and I would suggest that you perhaps supplement what you have told me here today with a good solid brief for the Air Force as to why the AX should be continued, because I am intrigued by the thought—and I have to admit that I am operating a little bit on intuition and I don't want to operate too much on intuition—that it may be a good idea to forget the AX, providing that Lockheed has the answer.

One thing that I remember from my own experience that causes me to feel that way is, if the Army had this as an integral part of its own setup, we wouldn't have to have that Air Force liaison fellow kicking

around headquarters so much.

General GLASSER. Certainly there is this roles and missions question that you are referring to here, and certainly your observation is correct that over the years the Air Force might have been more aggressive about fulfilling its responsibility for the close support of the troops in conflict.

We responded to that pressure. It has been very slow in manifestation. It is now about 3 years that we have been working on the AX. I responded to Senator Goldwater and the Cannon Subcommittee to the effect that, "Yes; this is a relatively slow program, and we have

learned our lesson of the past."

At the time the Air Force began to sponsor the AX program, we were doing it along the lines that we had grown accustomed to—of coming up with the whole program all at once. We simply weren't able to get through all of the levels of review with that big a package. Belatedly we have concluded that the way to do this is to bite off a small chunk; namely, produce the prototypes, two each by two con-

tractors, and demonstrate them in hardware that you can go out and touch and watch fly, and measure their performance. Then, for a relatively small investment—I know \$60 million sounds like a lot of money, but in terms of weapons systems that is a relatively small amount of money—you will be able to have pure physical evidence, tangible evidence of what we are asking for.

I am personally totally convinced, perhaps parochially so, that an AX, which will do 80 to 90 percent of all of the missions of the Cheyenne, and at one-third the cost, is the thing to do. But I would submit that the services and the Congress and the country deserve the opportunity to look at both of these in hardware and make their determination on the basis of true costs and of true performance.

We are not in a position to examine either of these vehicles in that context today, so that what both of the services are asking for, as I understand the Army's position and as I know ours, is to proceed through this development phase and allow that solid decision to be

made.

AX PROTOTYPE

Senator McIntyre. You say then the position of the Air Force and Army is that we should go ahead and get a prototype AX, and hopefully come through with the Cheyenne, and then compare at that point

before we go into any massive procurement.

General Glasser. Compare the performance and ask the contractors with a sharp pencil in their hands what are you really going to charge for production contracts because now we are not talking about brochures; we are talking about signing a fixed price contract, because both of these air vehicles will be hard physical objects that can be priced.

HELICOPTER FUNDING

Senator McIntyre. General, is it feasible for the Congress to vote funds to carry on the Cheyenne program, and in the meantime wait for the Air Force to come up with its AX from the funding stand-

point?

General Glasser. The Army is not asking for production funds on their program. They are in a research and development phase at this time. You see, Senator, what concerns us in part, is something you alluded to a while ago in talking about the magazine article. I will read the magazine more carefully. I have been captured by only one article in there so far, but I will want to break away from that page and look at that helicopter article. The data that we have shows that in Southeast Asia, which is the only real exposure place these days, the helicopter has been losing substantially more numbers than have the fixed wing aircraft. Perhaps the problem here is one of choosing parameters. If you look at losses per sorties, that can give you a very misleading feeling regarding the vulnerability of helicopters, because a helicopter sorties can be to go from this side of the air field to the other side. There he may pick up a load to go to the next field and he has then made two sorties. For an Air Force airplane on the other hand a sortie may have been to Hanoi and back.

Senator McIntyre. It alludes to that. I think it is an article written. It isn't full of statistics, but the thing that struck me, of course, was that without realizing it, these two programs were really moving

very close together, the armed gunship with its considerable apparently more firepower than the AX, and the fact that it would be integrated into the Army system. In other words, I suppose the TE of the division would have so many helicopters.

General Glasser. If I may respectfully disagree with you, sir, we don't think that the Cheyenne gunship as it has been described to

me---

Senator McIntyre. This article says that.

General Glasser (continuing). Has a higher firepower.

Senator McIntyre. You read the article and give me a call on the phone.

General Glasser. I would like to do that.

Senator McIntyre. I don't stand behind the credence of the article. The name of the magazine is Government Executive.

General GLASSER. Yes, sir, Government Executive.

Senator McIntyre. I think it is the last article in the book.

General Glasser. I want to make it clear in the record, if I may, sir, that the Air Force is totally openminded as regards the utility

of the Chevenne compound aircraft.

We do have our minds wide open, and we do encourage this mutual development, but if pressed to a decision at this time we see these short-comings that we describe. If pressed to make a decision in the absence of the whole story, we would favor going with the ΛX , for the reasons I have attempted to describe. I will look into this further and I will be back to you with further discussion.

(The information follows:)

The Article, "Army Aviation: After Vietnam, What," which appeared in the March issue of Government Executive, is certainly informative from the standpoint of Army aviation goals. However, it does not appear to make a comparative evaluation of the firepower of the Cheyenne versus the A-X. The article does refer to certain specific armament capabilities of the Cheyenne and states the

intense desire of the Army to possess such an aircraft in its inventory.

It has been implied that the Cheyenne has greater firepower than the A-X. I would have to disagree with that since the A-X can carry more ordnance—16,000 pounds vs less than 8,000 for the Cheyenne. Its high velocity gun will be much more lethal and effective than the 30-mm cannon carried on the Cheyenne. The A-X can carry a wide variety of rockets, bombs, and dispenser munitions. The designed-in survivability of the A-X, consisting of more than [deleted] pounds of armor (versus [deleted] for the Cheyenne), dual, manual flight controls, redundant engine, self-sealing and foam filled fuel tanks, and redundant structural spars will make it significantly more survivable than the Cheyenne, particularly in the more sophisticated hostile CAS environment expected in the late 1970s.

With reference to loss rates as described in the magazine article, they can be very dependent upon one's choice of parameters. As I suspected, the author uses "losses/100,000 sorties" as a parameter in comparing helicopters with fighters. The vastly different purpose and character of helicopter and fighter sorties makes this a highly misleading point of comparison. For example, an in-country helicopter may be credited with 8 or 10 sorties per "trip" whereas a fighter is credited with only one sortie on a refueled in and out sortie to Hanoi. Perhaps a more meaningful way to describe the loss rate is the number of aircraft lost over a period of a year compared with the average number of aircraft possessed.

The following chart illustrates this loss rate for three different helicopters and three fixed winged aircraft operating in South Vietnam during FY 1968 and FY 1969. These six were selected because they are the workhorse air vehicles for each Service. Although the F-100, F-4, and 0-1 do operate out of South Vietnam, the following table utilizes information only from South Vietnam operations in order to make a valid comparison with the helicopters which operate only in

South Vietnam.

Туре	Average strength		Total losses		Percent	
	Fiscal year 1968	Fiscal year 1969	Fiscal year 1968	Fiscal year 1969	Fiscal year 1968	Fiscal year 1969
H1IG	49 174 72 205 115 165	193 326 359 254 100 152	[Deleted]			

Another significant statistic is the number of helicopter losses to the theater during the fiscal year. For FY 68, the Army reported theater losses of 995 helicopters. Theater losses of over 2000 helicopters of all types were reported for FY 69. It is therefore stretching the point to say that "the Air Force F-100 and F-4 loss rate is over five times the loss rate of the Army's two attack helicopters."

These statistics merely punctuate the obvious point that the article stops for short of presenting an objective comparison of Army helicopter and Air Force aircraft performance under combat conditions. It is clear from the text that the piece was based solely on an interview with an enthusiastic officer whose job it is to develop and justify newer and better Army aircraft. As the author indicates, the trends in Army aviation activity do raise valid public questions regarding potential duplication of effort already a recognized part of Air Force responsibility. One is entitled to expect that the assignment of such responsibilities will continue to be based on a more thorough study of the facts and a more balanced analysis of capabilities and costs than this article presents.

AVIONICS DEVELOPMENT FUNDING

Senator McIntyre. Thank you, General. You are asking for \$18.1 million for F-4 avionics development, an outgrowth of efforts accomplished previously under the aircraft equipment development program. Why isn't this appropriate to the in-service engineering, model improvement, or modification programs financed under the "Aircraft procurement appropriation"? Wasn't that the approach on the Wild Weasel aircraft?

General Glasser. I have a little difficulty answering that, because these ground rules change from year to year as the Comptroller has attempted to purify the appropriations. The part that we are talking about on the F-4 avionics is the development aspect. Even in the most extensive modification programs we frequently have R. D. T. & E. charges for the development of that modification prior to its incorporation. The part for which the aircraft procurement act is used is to build the kits and do the modifications themselves. I am sorry I don't have our modifications people here with us today.

Senator McIntyre. Do you want to answer that more fully for the record?

General Glasser. I would like to extend these comments in the record if I may, sir.

(The information follows:)

Past Wild Weasel programs were accomplished under the aircraft modification program using off-the-shelf or modified off-the-shelf hardware. The proposed F-4D Wild Weasel program will result in an advanced system specifically tailored for the future Wild Weasel mission. There is no available equipment which possesses the required capability, so a development program has been initiated. Upon the successful completion of the flight test program, procurement and installation of the system in operational aircraft will be accomplished through the aircraft modification program.

STATUS OF AIM-82 PROGRAM

Senator McIntyre. Any time a question appears to be that, don't hesitate to ask for that permission. The better answer is the one more fully considered and inserted in the record than the one you try to grasp from your memory. We will expect a more full answer to that question for the record.

A development concept paper for the short range air-to-air missile (AIM-82) was submitted to OSD for decision on November 17, 1969. You state that assuming a favorable decision, you hope that requests for proposals would be released in February 1970. What is the current situation? If the decision has not yet been made, wouldn't the program slip and the fiscal year 1971 requirement for \$37.2 million be reduced.

Mr. Hansen. The decision was made to move ahead, and get contractor inputs on the AIM-82. These were to be used together with the results from the AGILE program as inputs to the planned meeting with Secretary Packard in July. At that time the decision would be made as to how we would proceed with a single short-range missile program that would take care of both the F-15 and the F-14.

Senator McIntyre. This decision must be made by the Secretary in July and it could affect the requests for the budget, the budget

requests?

General GLASSER. I have to be a little careful to say yes or no to that. What we are looking for, of course, is a missile that will serve both services, and at the moment the Air Force is acting as the execuctive agent to resolve this. It is our presumption that whichever of the two candidate missiles are selected, we will mutually fund them or jointly fund them.

Senator McIntyre. We will be keeping this in mind and probably pester you, hoping that OSD has made up its mind one way or another because we are looking for dollars here if we can find them to save.

General GLASSER. Surely. We will know a lot more as the months go by.

ESTIMATED COST OF 30-MILLIMETER SUPPORT GUN

Senator McIntyre. Your descriptive summary does not show an estimated total development cost for the 30-millimeter close-air-support gun. Do you have an estimate for this program for which you are requesting \$20.9 million in fiscal year 1971?

General GLASSER. I am sorry.

Senator Mcintyre. Your descriptive summary does not show an estimated total development cost for the 30-millimeter close-air-support gun. Do you have an estimate for this program for which you are requesting \$20.9 million in fiscal year 1971?

General Glasser. That is a cost of completion for the program?

Senator McIntyre. Yes.

General GLASSER. It is approximately [deleted] million. I will have to dig out the number here. An aggregate total of [deleted] over the 4 fiscal year time periods of 70, 71, 72, and 73 funding.

Senator McIntyre. You are asking for \$20.9 million in fiscal 1971. What I am asking now is does it show an estimated total development

cost?

General Glasser. Are you asking on the 30 millimeter or on all of the guns?

Senator McIntyre. The 30-millimeter close-air-support gun, singu-

lar.

General Glasser. The fiscal 1971 funding of \$20.9 million embraces three guns, the 25-millimeter at 10.15, the 30-millimeter at 10.25, and 20-millimeter efforts for 0.5. The numbers I gave you previously are the total cost for the 30-millimeter gun over a 4-year period.

SOURCE OF TRUCK INTERDICTION FUNDS

Senator McIntere. You state that under the Truck Interdiction program, for which you request \$10 million, you awarded four small contracts to provide a number of devices for a competitive "shoot off" leading to engineering development. Will you explain how you financed this, since this program was not in the budget approved by Congress for fiscal year 1970 and we have not been notified by DOD that the reprograming of \$10 million has been formally approved. We are also informed that the OSD Comptroller has not released any of the \$10 million.

General Glasser. This is a result of the creation of the truck interdiction line item by the office of D.D.R. & E. They, recognizing the importance of this area, elected this year to create a new line item

labeled for that purpose.

They intend to incorporate in that a series of efforts, some of which have been previously conducted under the operational development line items. These small contracts you described were let using funds out of these existing operational support programs, with the expectation that at such time as D.D.R. & E. released funds against the truck interdiction line these projects would continue development and be financed by the truck interdiction program.

Senator McIntyre. Do you have that flexibility?

General Glasser. Yes, sir.

Mr. Hansen. I might say that there is another program element called armament ordnance development which has been in the budget. The truck interdiction program element was broken out at the direction of D.D.R. & E., I would presume because they want to put emphasis on this particular effort, and to be able to monitor it more closely from their office. The things that have been done, if there had not been a truck interdiction program element, would have been legitimate tasks to do under the basic armament ordnance development

program.

General Glasser. Our understanding of D.D.R. & E.'s failure to release the funds at this time is that they are awaiting the submission being generated in Systems Command. This will come up through us as a total package describing what purposes we are going to use that truck interdiction line for. While awaiting that package, which they have requested, they are deferring all funds under that line item. I don't think that they would intend for us to not go ahead with the programs that have always previously been handled under the armament ordnance support, and if they never release truck interdiction, would continue to be funded in there.

Mr. Fine. If what you said were so would this be considered a reclassification action in the classical reprograming sense and therefore be reported on your initial reprograming action No. 1. I don't think this was done. Therefore, I don't think that it is in the sense of a strict interpretation of the rules that it would be considered a reclassification. It is a new starter otherwise, unless it was picked up on your initial reprograming action, although I recognize that efforts could have been on-going in other programs previously. It is a technicality here which we are addressing.

Mr. Hansen. I accept what you say. I am not familiar with the

technicality.

General Glasser. May I ask Colonel Hoermann.

Colonel HOERMANN. What Mr. Fine says is correct. However, even though some of the work was formerly in armament ordnance development, it wasn't picked up in the first reprograming. It is in reprograming No. 3, which is being processed in the Pentagon. This reprograming would realine those items that we came up within our apportionment request which were different from the President's budget and

were not included in reprograming request No. 1.

Mr. Hansen. I might say gratuitously that the establishment of additional program elements is a trend which I have noticed in the little time that I have been over in the Pentagon. I intend for the fiscal 1972 budget, to the extent that I can influence this, to try to reverse that trend. I think we have program elements that split out things rather more finely than is really necessary, and I find it rather confusing to me when I look at these books and find a particular task that is spread over several program elements. I can imagine how much more difficult it must be for you folks to track those things through. I will campaign in the makeup of our budget structure in the future, to the best of my ability with D.D.R. & E. and the Air Force budgeting people, to see if I can't minimize the number of those program elements that we have.

I think it will make it simpler for everyone.

General Pitts. The Air Force budget people are in absolute accord with Secretary Hansen. We would like to have the budget with fewer program elements.

Senator McIntyre. Incidentally this truck interdiction, did I view this or see some movies of this while I was at Eglin Air Force Base

in January?

General GLASSER. You very well could have. There are a number of projects that would ultimately be included in that line that are done at Eglin, various land mines and things of that sort.

Senator McIntyre. It seems as though we had some discussion on

it. It must have been some movies that I saw.

General Pitts. You may have seen a movie of some firings from a gun ship on truck interdiction in South Vietnam, on the Ho Chi Minh trail.

General Low. You might have seen the gun ships. Particularly during the wintertime they fly out of Eglin.

Senator McINTYRE. I am sure I didn't see it in actuality. It must have been a film. This is conventional ordnance.

General Glasser. Yes, sir, this is in the armament laboratory and the armament development and test center at Eglin.

LACK OF CONGRESSIONAL APPROVAL

Senator McIntyre. The next question bears on this discussion we have been having on this budgetary question. The question is this. If in fact, you have let these contracts you may have committed the Government to a development program which you estimate will total [deleted] million without the approval of the Congress. Will you comment on this.

General Glasser. I believe that that is incorrect, because I only discovered this problem myself this morning, so I will have to extend in the record if I may sir. My understanding at the moment is that we are committed only to some small contracts which in themselves would be of limited cost, and which may reveal certain approaches that could be developed with these funds. We are not committed to anything like \$ [deleted] million at this time.

Senator McIntyre. I will expect you to comment in the record

then as to that question.

General Glasser. Yes, sir. (The information follows:)

There is no commitment to a large development program. The existing contracts funded a "fire before buy" test program for an improved "truck killer" munition. This test program is currently underway. The most effective munition/munitions out of this present contracted effort would be proposed for engineering development.

In this test program, four contractors were selected on the basis of the merit of their technical proposals and their ability to provide test hardware rapidly. They were selected from some 43 proposals received. All contractors were cognizant of the limited scope of this current effort. All four of the contracts are small, with the total of the four being \$172,390. The funds were provided from P.E. 64712F Armament/Ordnance Development.

These funds were for the purpose of covering hardware costs for the test. The present contracts do not commit the government to any further expenditures. If the initial tests indicate further development of these concepts is warranted, new contracts will be negotiated under the new line item, (Truck Interdiction)

when the funds are released by DDR&E.

Senator McIntyre. Will you provide for the record the details on any other fiscal year 1970 R.D.T. & E. programs which fall in this same category.

General Glasser. Yes, sir; if I can find them.

(The information follows:)

We have checked the R.D.T. & E. Program and could find none.

DELAY IN FUND AVAILABILITY

Senator McIntyre. With this delay in availability of fiscal year 1970 funds, why do you need an additional \$10 million for fiscal year 1971? I am talking about truck interdiction.

General Glasser. That is another one I have difficulty answering at this time, sir. The classical approach to the operational development programs is that these are programs that develop throughout the year. Each year we sit down and we attempt at budget formulation time to identify the probable makeup of these various operational support line items. However, historically we find that we change them in substantial measure throughout the year, because they are things that are in true support of the operational forces, and we identify only the most urgent of them. This has been particularly true during the South-

east Asia period. This tends to become a level of effort sort of budgeting, and I believe that is what you are seeing here. It is anticipated that approximately that level of funding will be required in the future years to continue with the sorts of things that we have come up with in the past years.

Senator McIntyre. This committee is interested in that \$10 million, if we can get it away from you and you can still carry on your truck

interdiction program.

General GLASSER. I understand sir.

NAVAL PARTICIPATION IN PROGRAM

Senator McIntyre. What has been the Navy's experience in truck interdiction compared with the Air Force's [deleted] percent killed-versus-struck ratio? Are they doing any developmental work in this area? Do you know?

General Glasser. Yes; they are involved in it. I would prefer to defer to the Navy to respond to the specific questions. Some of the

munitions that we use are Navy development and vice versa.

(The information follows:)

The Truck Interdiction program element was established to provide munition development funding support for Project PAVE MACK. The objective of Project PAVE MACK is to improve, on an accelerated time-scale, the enemy truck kill rate in Southeast Asia. PAVE MACK was initiated in July 1969, at the request of the Director of Defense Research and Engineering. Preliminary estimates of the program content and schedules indicated a 30–36 month program with funding requirements of [deleted] million. Since the program was initiated six months after the Presidential Budget submission, FY 70 funds have been administratively deferred until DOD Reprogramming (R-2) No. 70–61 is endorsed. Since USAF has been unable to negotiate with contractors because of deferral of funds, definitive cost estimates are not available. However, program planning did consider a late FY 70 release and the program must be viewed as an integrated, sequential multi-year program responsive to the tempo and pace associated with the operational requirement. The loss or reduction of FY 71 funds would be premature at this time because the time scale to which the program is geared makes it impossible to plan a program which does not include FY 71 funding. Further, loss or reduction of funds could pre-empt potential technical approaches and diminish the armament development community's ability to provide an all-altitude, all-weather, SEA Truck Interdiction capability, which will accommodate the increasing defensive levels within the delivery environment.

REDUCTIONS IN CONVENTIONAL WEAPONS REQUEST

Senator McIntyre. You state that you are requesting \$27.5 million for conventional weapons, including exploratory, advanced and engineering development. This is \$10 million less than your fiscal year 1970 program. Does this marked reduction reflect the reduced level of activity in Vietnam or rather a lowering of the priority of this area of limited war development?

General GLASSER. In part it reflects the items that we just finished talking about. Certain of the things that previously were conducted in conventional weapons would be anticipated to be in this truck interdiction area. To get specifics on that I would have to research it, because there has not been a relaxation in our priorities on this area

which I am aware of.

Senator McIntyre. It is not due then you say to the reduced level of activity in Vietnam or a lowering of the priority of this area of limited war development? Neither one of those is the answer?

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General Glasser. No, sir; I think it is probably more the question that Secretary Hansen was describing a moment ago, the proliferation of line items. Certain of the things that have previously been done under conventional munitions have been broken out into other line items; my own intuition is that we have substantially increased this activity over the past few years rather than any dimunition of it.

LOCKHEED SITUATION

Senator McIntyre. Your descriptive summary indicates that the \$11.6 million requested for the fiscal year 1971 C-5A program completes the development program. Does this mean that any financial impact of the Lockheed situation will be felt only in the production

program?

General Glasser. Mr. Chairman, I would be very reluctant to say anything as regards how the C-5A program would be financed. I believe that the way you have described it is correct, but it will depend on the course that is chosen for resolving this contract. As of this time the only location for funds to solve this problem is in the procure-

Senator McIntyre. General, Mr. Secretary, will you give us an

answer to that in writing for the record?

General Glasser. Yes, sir. If you want it in the near term it will probably be not much more definitive than I am able to give you off the top of my head now.

Senator McIntyre. I think you have until about April 15 hopefully.

(The information follows:)

The \$11.6 million requested for RDT&E in the FY 71 Budget completes the funding for the development program. Since this procurement is being accomplished within a single contract ceiling for R&D and production categories of funds under the provisions of total package procurement, we have consolidated the requirement for resolving the Lockheed financial problem in the production account. This is indicated by our FY 71 request for the \$200 million identified

as contingency in the production account.

Resolution of the C-5 financial problem can only be achieved within the framework of an overall solution to the entire Lockheed Corporate problem. Intensive efforts are underway within DOD to reach an agreement with the contractor which will protect the best interests of the government while assuring continued performance of these defense programs. The Deputy Secretary of Defense has advised the Committee that it may be several months before this problem is resolved. It therefore appears that the answer you have requested will not be available until sometime after 15 April.

SUPPORT OF LIT STUDY

Senator McIntyre. The request for \$1 million last year for Light Intratheater Transport (LIT) studies was not approved by the Congress. What has changed since then to support your fiscal year 1971

request for \$2 million?

Mr. Hansen. Our understanding of the congressional action last year was that the money for LIT was disapproved because of the belief that we didn't really know what we were going after. We have done a considerable amount of work in the meantime. We have looked at the fiscal realities of the out years, and recognized that we are not about to launch off into a major development program.

Our current plan is to continue for some time, at a reasonably low level, technology work and studies that lead to the ability to start a

program when we know more about what we will do.

The need has not gone away. It has become clear that there has to be an interim solution which we believe is a procurement solution, probably with C-130's or some modification of them, or C-8s. The longer term solution, we still believe, requires the development of the V/STOL type airplane.

Senator McIntyre. Do you take any precautions to coordinate your thinking and development or ideas on this LIT, with the Army's advance helicopter development program and the Navy's, to insure that there is no unnecessary duplication of technological effort here?

General Glasser. Yes, sir; we are in continual close coordination

with the Army and the Navy on these programs.

Senator MCINTYRE. Will you provide for the record a listing of all R.D.T. & E. programs and projects which support V/STOL and VTOL efforts showing the amounts for fiscal year 1969, fiscal year 1970, and requested for fiscal year 1971. Also include a discussion of the interrelationship between these programs and their ultimate objectives.

General Glasser. Yes, sir. (The information follows:)

R.D.T. & E. PROGRAMS AND PROJECTS WHICH SUPPORT V/STOL AND VTOL EFFORTS

(In millions of dollars)

	Fiscal year—		
	1969	1970	1971
P.E. 63204F, light intratheater transport. P.E. 63205F, flight vehicle subsystems (VTOL integrated flight control system). P.E. 63214F, VTOL engine development. P.E. 64207F, US/FRG V/STOL.	7.0	0 0 5 2	2 0 3 0

The Light Intratheatre Transport program was an effort leading to replacement of C-7 and C-123 type aircraft. The V/STOL concept selected was a tiltwing turboprop aircraft, and funding in FY 69 was used for large diameter propeller investigations. Funds in FY 71 are for flight control work and engine studies. Propeller effort is funded in VTOL Engines program in FY 70 and 71.

The VTOL Integrated Flight Control System (VIFCS) was an effort to develop and validate flight control criteria for V/STOL systems, using the XV-4B. The program was closed out prematurely after the accident which destroyed

the only XV-4B.

VTOL Engine Development has supported two projects, the joint US/UK lift engine and propeller investigations (FY 70 and 71). The lift engine is a high thrust to weight turbofan engine which was proposed for the US/FRG V/STOL fighter. When that program was not continued, the US and UK agreed to continue the lift engine program until FY 70 to advance lift engine technology.

The US/FRG V/STOL program was for a joint US/German and V/STOL fighter. Funds in FY 69 and 70 were used for critical technology items after the US and FRG jointly agreed not to continue into prototype construction in January 1968.

LASER PROGRAMS AND PROJECTS

Senator McIntyre. You stated the importance of your advanced development efforts in High Energy Lasers. To permit a better and more comprehensive understanding of this new technology, will you provide a list of all the programs and projects related to this subject

showing the amounts for fiscal year 1969, 1970, and 1971. Will you include a discussion of the interrelationship between these programs and their ultimate potential.

Mr. Hansen. Yes, sir.

(The information follows:)

The Air Force started an Advanced Development Program for High Energy Lasers in FY 69. Prior to that time, advanced research efforts for high energy laser techniques were funded and directed primarily by ARPA (Advanced Research Projects Agency) with the Air Force acting as executive monitoring agent. [Deleted.]

The High Energy Laser Program contains two tasks, [deleted]. Funding for the total program has been \$4.723M and \$7.0M for fiscal years 69 and 70 respec-

tively. The planned funding in fiscal year 71 is [deleted].

[Deleted.]
This system related technology is being pursued in parallel with development of the laser power devices. These efforts were started in FY 69 and funded through FY 70. The major equipment item under this contract with Hughes Aircraft is the Field Test Telescope. It will be delivered this summer to the Air Force Weapons Laboratory. Another item, [deleted], will be funded in FY 70 and 71 and be delivered during FY 71.

[Deleted.]

Other than the High Energy Laser Program, the Air Force has four projects in Exploratory Development which are for advancing laser technology. Three of these projects are oriented toward advancing laser technology and exploiting lasers for specific applications in a number of areas such as laser guided bombs, laser reconnaissance systems, ring laser applications, holography, optical surveillance, laser communications and range finders. These projects in the Aerospace Avionics Program are "Coherent Optical Device Physics", "Laser Technology", and "Laser Techniques for "Aerospace Applications". The fourth project is "Laser Applications" under the Advanced Weapons and Applications Program. The funding for all four projects was \$5.4M in FY 69 and \$6.05M in FY 70. Planned funding for FY 71 is [deleted]. This last project and the ARPA funded Exploratory Development programs are the primary sources of new ideas for high power laser devices.

Senator McIntyre. Are your laser efforts and those of the other services coordinated?

Mr. Hansen. Very closely coordinated by D.D.R. & E., and by mutual action of the services themselves. The total laser research and development activity is one which is very closely supervised by D.D.R. & E.

PURPOSE AND REASON FOR TRAINING PROGRAM

Senator McIntyre. You are requesting \$3.5 million for a program entitled "Innovations in Education and Training." This program was supported at a level of \$433,000 in fiscal year 1968, and \$600,000 in fiscal year 1969. No funds were requested for fiscal year 1970 and none have been programed for that year. Why this sudden major emphasis? Why shouldn't this be a level-of-effort program continued at about \$500,000 per year and augmented with in-house work both by Air Force Systems Command and the Air University?

Mr. Hansen. Yes. The reason for the amount in fiscal 1971 is the desire on our part to move ahead with an undergraduate pilot training simulator development program. I think the reason for the gap was that although the Air Force, at the training command level at least, wanted to get some research done in an improved simulator for training, and believed that by doing that we would in the long run save a lot of money by limiting the number of actual flight hours required, it took a while to get the system sold on the fact that it was a good idea.

We are now convinced that it is a good idea. There can be substantial savings in the cost of training pilots in the basic flight skills. We now want to move ahead with the development work for this undergraduate pilot training simulator.

Senator McIntyre. Will you please explain what your present undergraduate pilot development program cannot do which this pro-

gram will improve?

Mr. Hansen. I would be glad to try to do that. Perhaps I need to clarify what I have just said. We don't think that this will permit us to do anything that we can't now do. We think it will give us the means of doing what we now do much more economically, because we can bring a pilot to a certain level of training and proficiency, with far less actual flight hours by substituting simulator hours.

In this sense it is analogous to the training that they give young people in school in driving. They have a relatively few hours out on the road in the car and a lot of hours in trainer simulators, in which they can develop most of the basic skills so that with the relatively few of the more expensive hours they are brought to the same level of

proficiency.

SIMULATOR COST AND DEVELOPMENT

Senator McIntyre. Is this \$3.5 million an investment in simulators or is it a development leading up to a simulator?

Mr. Hansen. It is an investment in the development leading to the

design—the design and testing of a prototype simulator.

Senator McIntyre. After you have got a prototype on this simulator, what is the estimated cost for production of the simulators?

General Glasser. I think we have to wait to see how successful we are with it, and just how extensive it should be. This is in many respects analogous to the old Link trainers that we have had for years and years. The hope it that we will be able to come up with a simulator which is sufficiently accurate in its simulation that it will allow us a substantial reduction in the flight hours that these pilots require for their completion of UPT. Through this R.D.T. & E. program we will be conducting tradeoffs to see just how extensive a simulator we can justify versus the savings we can make, so I don't think we can give you a number this early in the game as to what the production cost would be.

Senator McIntyre. The question arises if you don't know or have any idea what the ultimate costs of the simulators are going to be, how do you know whether it is worth \$3.5 million to try to find out

what prototype simulator will be?

General GLASSER. We don't, but we do know that if we are successful—and our expert people in training techniques believe that we should be able to be successful—we know that there are substantial savings to be made in the training programs. In that respect it is like many of our development programs. We have to have the good judgment and intuition to decide that this looks like a payoff area, and to conduct a reasonably low level effort to find out how good this payoff is likely to be, and then make a decision based on that.

As a matter of fact that transports me back to the very earliest part of the hearing this morning, when I said that there needs to be more R.D.T. & E. money available to allow for more of these explorations,

and excursions, to see where the payoff areas are. It is a very little bit of money to spend \$3 or \$4 million to identify the right course rather than to make a hunchback guess that you are on the right course and spend \$100 million and find out you were wrong. That is the essence of a lot of the kind of programs that we have in this line item.

Mr. Hansen. I might extend that a little bit by saying that it is my understanding that we are soon coming up on a period when the T-37s, and the T-38s that are now used for undergraduate pilot training will all have to be replaced, simply because they are wearing out. If we could devise something that would permit us to only have to procure say half as many as we have now, because we could do that training with significantly less flying hours, then we could pay a fairly large sum of money for simulators and still be way ahead.

While we haven't progressed far enough to actually have cost estimates on the simulators themselves, if we figure the cost of a fairly large number of T-37s and T-38s it seems that for substantially less than they cost, we should be able to provide a fair number of

simulators.

General Glasser. I might give you an illustration, Mr. Chairman. In the procurement act we were speaking of the T-X aircraft for navigation training, and an associated set of navigation simulators. The aircraft that we were talking about buying to do the airborne training of these navigators runs some \$8 or \$9 million a copy for that airplane, and substantial amounts of operating costs go along with this.

Senator McIntyre. The more you gentlemen discuss it the more I

wonder why you haven't done it 5 years ago.

General Glasser. This is why I am saying we are in the program right now asking in the Procurement Act for the authority to procure 14 simulators this year for navigator training at a cost of some \$1.6 million a copy. We think this is a dramatic saving over the number of aircraft that would be needed if we did all of this in an airborne state. So the program that you are questioning now is an application of that technique to basic undergraduate pilot training. We think it will work, but we need to pursue it awhile to be sure.

BEHAVIORAL AND SOCIAL SCIENCES PROJECTS

Senator McIntyre. Mr. Secretary, will you provide a detailed list of projects and tasks which you are supporting in fiscal years 1969 and 1970 and proposed for fiscal year 1971 under "Behavioral and Social Sciences" (\$1 million is requested).

Mr. Hansen. Was that request for the record?

Senator McIntyre. Yes; for the record. That won't be so long. I was just thinking of those long lists on the university program. Yes; for the record.

Mr. Hansen. This is an area which has caught the attention of Congress for several years, and we have scrubbed it pretty hard. I believe if you wanted to take the time now we have got the experts here that have that list available, or we can furnish it for the record as you choose.

Senator McIntyre. I am willing to have you furnish it for the record. Actually, my own feeling on this program as it was first explained to me, it came through loud and clear. I could see it made a lot of sense.

But it gets all mixed up you see on the floor. Because these items weren't broken out you got clipped last year because I couldn't define what in the name of goodness the university program was, what the foreign program was, and so the extra \$47 million that hit you as a result of the Fulbright amendment was just unfortunate in that respect. I think that from the standpoint of social and behavioral sciences and human factors and performance that you make a very strong case; but what you are talking about here really is a simulator.

Mr. Hansen. Right. (Off the record.)

General GLASSER. Mr. Chairman, we have run into most of our problems in the social science areas, and we have really purged the program so that the name "social" will be eliminated from the program and title. I believe that you will be in a much better position this year

to defend the program on hard-core requirements.

Mr. Hansen. We will be happy to put the information that you have asked for in the record. There is one point I would like to make in the record though, and that is that we have a very large investment in equipment. We spend a lot of money in research and in modification and in maintenance to take care of that equipment and make sure that we get the best utilization of it, and yet the principal resource that we have is people. The basic intent of the behavioral science program is to do research work to better understand how to select people, how to train them, how to motivate them, how to retain them, how to recruit them in novel constructive ways that will permit us to do better in an area where I think we have the greatest opportunity to do better, and to become more efficient and more effective.

Senator McIntyre. Many times it is difficult to get the full Senate to listen to the case, due to their many other duties. However, if we have the details in the record where they can be reviewed, we can protect these areas from getting, what would you call it, sort of a meat

ax approach?

(The information follows:)

THE USAF BEHAVIORAL SCIENCES RESEARCH PROGRAM

1. PERSONNEL AND MANPOWER

This research area deals with problems encountered in recruiting, retaining personnel and assigning them to specific Air Force training courses and to Air Force jobs. It is concerned with the manpower problems of matching inputs to Air Force qualitative and quantitative manpower requirements. It provides basic personnel and manpower data and techniques to the Human Resources Laboratory of AFSC, to Air Training Command, Air University, and to pertinent HQ USAF staff offices such as AFOMO, AFPDC, and AFXPD. These studies relate to the increasingly difficult problems facing the Air Force recruiting, retaining and assigning its personnel to specific career fields, required training courses, and providing personnel who meet the exacting demands for highly skilled operators in critical assignments. Accordingly, research in this task area emphasizes the development of behavioral science techniques for improving aptitude and proficiency assessment of personnel, measurement of motivation and morale, occupational analysis, determination of required force structure for different Air Force missions, and basic psychometrics which can utilize computer technology to improve personnel management and performance assessment procedures. The research will provide methods for identifying and labeling human capabilities and specific task requirements so that task elements can be assembled into job patterns that will utilize basic skills in the most efficient ways. Primarily the research seeks to optimize the functions of the Air Force personnel system in order to minimize costs and maximize personnel utilization.

2. TRAINING AND EDUCATION

This research relates to the training and educational programs carried out by the Air Training Command, Air University, and the Air Force Academy. The studies provide data for the development of methods and routines for basic training, technical and flying training, special warfare, resistance and survivial training, and for the many branches of AF professional education. The research provides basic support of the various training research divisions of the AFSC Human Resources Laboratory. All contracts and grants in this area are coordinated the appropriate Human Resources Laboratory division which also provides continuing and active technical collaboration with AFOSR and the contractor. Much of the research aso helps to satisfy needs made apparent by the plans prepared by AFPTR. HQ USAF. Research in this task area makes use of the empirical experimental techniques of educational and experimental psychology. computer science, and mathematical statistics. It is concerned with the laws of learning and retention, short- and long-term memory and recall, the relation of training to on-the-job proficiency, curricula content, teaching methods, training aids and devices (including simulators), computer-aided instruction, and training incentives and motivation. Studies focus on the relative efficacy of different modes of presenting training materials, enhancement of positive transfer from simulator practice, devising of training programs to minimize course length and costs without loss of job proficiency attainment, and assignment of training segments to formal and to on-the-job training programs.

3. HUMAN ENGINEERING

This research helps determine the performance capabilities of individuals and teams of men as they relate to the design of Air Force equipment and systems. It also provides information to establish human engineering principles and criteria for use in the planning, design, testing, operation and maintenance of such systems. The objective is to assure that men, as key elements in Air Force systems, will interact with machines in such a way as to enhance human capabilities and thus maximize systems effectiveness. Basic research in this area feeds data to various AFSC laboratories-primarily to the Human Engineering Division of the Aerospace Medical Laboratory, AFSC. Research in this task area makes use of empirical experimental techniques of physiological and experimental psychology, work physiology, physiological optics, psychophysics, audiometry, and physical anthropology. It deals with man as a sensing, collating, problem-solving, decision-making component (operator) of a man-machine system. Thus, on the sensing side, human engineers study visual, auditory and other perceptual processes to determine man's capabilities of reacting to various stimulus dimensions so that adequate instruments may be devised for displaying the environmental parameters to which he must react. Studies focus on the ways in which information may best be transmitted to the operator for processing into decisions and reactions. Research is concerned with man's psychomotor capacities, fatigue effects, alertness, and attentiveness, and the desirable characteristics of the work-space environment.

4. UNIT EFFECTIVENESS

This task area constitutes the core of the social science basic research program of the Air Force. It is concerned with the structure, design, leadership and management of Air Force units and organizations in order to enhance their operational efficiency and effectiveness in carrying out their missions under usual or stressful conditions and environments. This program of research is being reoriented to provide direct basic research support to the educational and training commands and staff agencies which are charged with providing leadership and management capabilities to the Air Force. These include the Air Force Academy, Air University, AFIT, and Air Training Command. Research on criteria for evaluating effective unit performance and the design or change of personnel systems will relate to research support requirements of HQ USAF staff offices such as AFPDP and AFOMO, and AFSC needs through coordination with the Human Resources Laboratory (DOL). Research in this task area uses the quantitative statistical and descriptive case-study methods of sociology and social psychology with the aid of computer technology for analytical and simulation purposes. The studies seek to provide the basic knowledge and techniques required to (1) Assess unit and organizational performance under different conditions and environments; (2) Design or change existing organizational and unit structure to maintain effective performance under changing conditions; (3) Determine

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management patterns, leadership characteristics, and unit motivational factors suitable to match different environmental conditions and operational demands; (4) Evaluate the effects of task, social and environmental factors that create stresses and organizational performance decrement. Consideration will also be given to the administration of personnel and manning needs of units and personnel functioning in stressful environments involving isolation and extended periods of duty.

FISCAL SUMMARY-BEHAVIORAL SCIENCES, SUBELEMENT 13, DEFENSE RESEARCH SCIENCES

	Fiscal year—			
Category	1969	1970	1971	
Personnel and manpower Training and education. Human engineering Unit effectiveness	\$61, 430 271, 316 543, 547 426, 748	\$177, 000 315, 000 234, 000 118, 000	\$145, 000 245, 000 430, 000 180, 000	
Contract/grant total	11, 303, 041 216, 000 265, 959	² 844, 000 56, 000	21,000,000	
SubtotalTHEMIS?	1, 785, 000 1, 040, 000	150,000		
Subelement total	2, 825, 000	1, 050, 000	1, 000, 000	

Actual contract or grant expenditures. This does not include indirect costs of \$216,000 for in-house support of the subelement, \$75,959 transferred to subelement 12 and not used for behavioral sciences, and \$190,000 to policy planning contracts which had been deferred from fiscal year 1968.

WORK UNITS FUNDED IN FISCAL YEAR 1969

PERSONNEL AND MANPOWER RESEARCH

RESEARCH IN MATHEMATICAL AND COMPUTER BASED METHODS OF SIMULATING AIR FORCE PERSONNEL SYSTEMS

Principal investigator: R. Hatch Decision System Associates.

Funds: FY-69-12 months, \$50,000 (1 Mar 69-28 Feb 70).

This research is directed toward the identification and correction of deficiencies in computer programs that provide models of the Air Force Personnel System. It investigates mathematical and computer-based methods of simulating the structure of the Air Force personnel system, and the changes which occur within the structure as a function of modifications to personnel management policies. The research effort will identify those factors in current methodology which impose limitations on the realistic simulation of the Air Force personnel system. The objective of the research will be to develop means of resolving these problem areas, and to appraise the benefits associated with various approaches. This contract effort will provide information required to develop a system for simulating the personnel force at critical transition points, including recruitment, initial training, assignment, reenlistment, overseas deployment, crosstraining, and reassignment. This research is in direct support of the exploratory development program of the Human Resources Laboratory, AFSC.

MEASUREMENT OF REACTION TO STRESS: FOR SELECTION AND TRAINING OF SPECIAL AF PERSONNEL ASSIGNMENTS

Principal investigator: Dr. S. Kugelmass, Hebrew University, Jerusalem, Israel.

Funds: FY-69-\$11,430 (completed 31 Oct 69).

This research will test the effectiveness of a standard physiological test to measure: (1) the emotional reaction of subjects to different levels of interviewing stress; (2) changes over time of fear reactions to threat; (3) the effect of individual and cultural differences in the responses to various kinds of stress. Subjects for the experiments are obtained by the investigator from various racial and cultural groups available in Israel. Different levels of stress are

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Proposed contract/grant expenditures.

3 Starting with fiscal year 1971, the university program (THEMIS) is eliminated and the funds are distributed to other appropriate subelements. In addition, the indirect costs have been distributed in order to indicate the full estimated costs of each category.

created by administering verbal test instructions and in real life experiences, such as making a job application and anticipating an important examination. Racial and cultural differences in the reactions to stress are being noted. The refinement of physiological measures of emotional reaction to stress will be useful to the Air Force in the selection and training of personnel for special military assignments. It will provide accurate measures of the stress response of personnel from different racial and cultural backgrounds. The investigator is an American-trained psychologist who has access to people in Israel from widely varied geographic and cultural backgrounds. The situations and subjects accessible to this investigator could not be duplicated in the U.S.

TRAINING AND EDUCATION RESEARCH

IMPROVEMENT OF LEARNING CAPABILITIES

Principal investigator: Dr. Arthur Lumsdaine, University of Washington, Seattle, Washington.

Funds: FY-69 months, \$73,406 (1 December 1968-31 May 1970).

The use of computers as aids to instruction and decision-making in the Air Force has already been initiated with favorable results. This research will further advance scientific knowledge in this fledgling area with the promise of greater utility and lowered costs. It will enable technical training instructors to modify instructional programs to meet the needs and to match the abilities of students as instruction proceeds. The research to be accomplished under this grant consists of an interrelated set of four projects directed at investigating man-computer interaction in problem solving and learning situations. Specific study areas are: (1) investigation of how computers can best be used to aid humans in on-line problem solving tasks; (2) study of computerized techniques to augment and assist intuitive decision-making; (3) investigation of the utility of different strategies which can be used in computer-aided instruction: (4) analysis of variables that determine the human ability to learn complex classification procedures. The project has developed a technique by which an instructor with minimal training, can revise immediately a program of instruction without the assistance of an expert programmer.

RESEARCH TOWARD THE IMPROVEMENT OF AIR FORCE TECHNICAL TRAINING METHODS

Principal investigator: Dr. Clyde E. Noble, University of Georgia, Athens, Georgia.

Funds: FY69-16 months: \$20,000 (1 May 69-30 Aug 70)

This research provides strategies for designing Air Force Technical Training curricula. It investigates learning and performance capabilities of students in training to perform various types of complex tasks. This research deals with human learning and performance of complex tasks. It explores the effects of such variables as amount of practice, variant and non-variant stimulus sequences, complexity, knowledge of results, work distribution, correction of error, and rest. The research examines individual and group differences in learning and the characteristics of the materials that, when learned, influence positively or negatively the learning of other materials. The tasks being studied are closely related to those encountered in Air Force technical training.

IMPROVING MEMORY OF RECENT EVENTS FOR AIR FORCE APPLICATIONS

Principal investigator: Dr. J. A. Robinson, University of Louisville, Louisville, Kentucky.

Funds: FY69-\$16,844 (20 months: 1 Nov 68-30 Jun 70).

Air Force jobs that are dependent upon adequate short term memory are those of the Air Traffic Controller, GCA Operator, and Controller, in a Command and Control Center. Understanding how information can best be arranged or coded for retention in memory and for later recall is essential to the design of optimal information display equipment. The research to be accomplished under this grant will investigate the way information is prepared for storage in memory and the rules that people apparently adhere to in recalling stored information. Information, meaningfully related in various ways, will be presented to subjects who must then reproduce the information according to different recall rules. Measures of speed and accuracy of recall serve as the criteria of relative success.

RESEARCH ON NATURAL LANGUAGE COMPUTER-AIDED INSTRUCTION FOR AIR FORCE TRAINING PROGRAMS

Principal investigator: Dr. Harry Silberman, Systems Development Corporation.

Funds: FY 69-\$90,000.

Computer assisted-instruction (CAI) offers many advantages and potential efficiencies in Air Force training programs. The major technical deficiency limiting the application of this technology in Air Force training programs is the lack of a capability for trainees to interact with a CAI system in unrestrained natural language. The objective of this research is to develop the principles and programming techniques which will permit an Air Force trainee to query and respond to a computer in relatively unrestrained English. The specific focus of the research will be to develop and demonstrate the rules necessary to translate a student's answer to a question into a logical structure that can be "understood" by the computer and related to stored information about the appropriate answer. In essence, the research will attempt to enhance a computer's ability to "understand" paraphrasing. A breakthrough in this area will result in enormous savings to the Air Force in terms of better training, reduced training time and training costs as well as fewer personnel tied up in the training pipeline.

RESEARCH ON THE DEVELOPMENT OF ADAPTIVE PATTERN RECOGNITION DEVICES

Principal investigator: Dr. Jack Sklansky, Department of Information and Computer Science, School of Engineering, University of California, Irvine, California.

Funds: FY 69-24 months: \$27,980 (1 July 1969-30 June 1971).

In aerospace reconnaissance missions, photo interpretation tasks and electronic intelligence operations substantial advantages could be derived from the development and application of "trainable" automatic pattern recognition devices—devices that could be "trained" to recognize and discriminate certain classes of patterns (targets, signals) of military significance. As a fundamental step toward this objective, this research seeks to define in mathematical terms the manner in which humans learn to discriminate between various simple patterns and to specify the rules that would determine when training should stop or be resumed, or when transfer to a related task would be optimal. In addition to serving as a basic step toward the development of automatic pattern recognition devices, the results of this research will be applicable to a wide array of Air Force training programs.

RESEARCH ON OPTIMAL CHARACTERISTICS FOR AIR FORCE TRAINING SIMULATORS

Principal investigator: Dr. Joseph Weitz, New York University, New York, N.Y. Funds: FY 69—24 months: \$43,086 (1 Sep. 69-31 Aug. 71).

This project seeks to identify those elements in the use of simulators in Air Force training that enhance or degrade learning performance. The research is relevant to many Air Training Command courses—especially to flying training. This research is designed to attack two problems concerning the use of Air Force simulators or simulation for training. The two problems to be studied consist of: 1) the identification of inappropriate elements in simulators which lead to habit interference when performing the "real" job, and 2) an investigation of the optimal amount of training on the simulator before transferring to the actual task. These are two related problems since it is possible that the negative transfer elements in the simulator can be avoided if training is stopped at the appropriate time. Simulators and "real" tasks will be developed and studies for the purpose of developing generalizations for identifying in appropriate elements and optimal time of transfer. These two variables will be related to various performance criteria on the "real" task. The results will be useful in determining the task components that should be included and those that should be excluded in the design of various Air Force simulators in order to optimize training effectiveness.

HUMAN ENGINEERING RESEARCH

RESEARCH ON LOW-ENERGY SIGNAL DETECTION CAPABILITY

Principal investigator: Dr. Robert E. Adamson, Department of Psychology, Florida Atlantic University, Boca Raton, Florida.

Funds: FY 60-36 months: \$112,427 (15 Sep. 69-14 Sep. 72).

This research is designed to provide data to improve the performance of Air Force radar operators and air traffic controllers. Dealing with target detection

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and identification when the signals are weak or when obscured by noise, the research will find many other Air Force applications including aerial search and rescue. The following subjects will be investigated: a) Identification of physiological changes which relate to signal recognition; b) Effects of stress upon observer accuracy; c) Relationship between physiological changes, feelings of certainty and uncertainty, and the accuracy of signal detection; d) Effects of combing information in different sensory input channels; e) Effects of stress on certainty, accuracy, and interpretation when two or more observers are interacting; f) Effects of repetitive patterns (for example, radar blips of regularly known flights) on the perception of weak or erratic signals. This research addresses the problems confronted by Air Force air traffic controllers and radar operators in early Air Defense warning systems when, under stressful conditions, they are required to make fateful decisions on the basis of weak and inadequate signals. It will provide data to improve training of these operators and to prevent performance degradation.

STUDIES OF PERFORMANCE IN COMPLEX TASKS

Principal investigator: Dr. George E. Briggs, The Ohio State University Research Foundation, Columbus, Ohio.

Funds: FY 69 \$49,985, 24 months (30 Sep 69-30 Sep 71).

This is a study of operator performance on complex tasks where overloads may occur. It seeks to develop techniques by which such Air Force personnel as pilots, air traffic controllers, radar observers, may best respond to multiple and simultaneous signals. In most Air Force jobs, the operator is required to monitor multiple information displays and to react differently to individual instruments with appropriate adjustments of various control mechanisms. This project examines the finds of information-processing activities that the operator must engage in and how these may be improved. Rules of information interpretation ("transform") and varying levels of rule complexity on information processing efficiency will be examined. The results have direct relevance for the design of interpretative and differential control response. This research is complementary to that sponsored by the Aerospace Medical Research Laboratory under Contract F33615-68-C-1656 with the same Principal Investigator.

EFFECTS OF MULTI-TASK TIME SHARING REQUIREMENTS ON CREW PERFORMANCE

Principal investigator: Dr. George Briggs, The Ohio State University Research Foundation, Columbus, Ohio 43212.

Funds: FY 69-12 months, \$58,910.

The purpose of this research is to extend preliminary studies undertaken under Contract F33615-68-C-1656 which investigated the effects on primary task performance (simulated pilot control of an aircraft), of perceptual set (e.g., expectancy), redundancy of verbal messages, and the degree and type of similarity between message items. The proposed research effort attempts to investigate the division of attention problem which is characteristic of, but not unique to, tactical fighter operations in SEA. Two sets of experiments will be accomplished under this contract. The first set of experiments will study the effects on primary task performance of having to process and respond to messages of different levels of redundancy and with different intervals of time between receipt of the message and the requirement to respond. The second set of studies will be performed to develop methods for quantifying operator overload where the complexity of the information to be processed in the secondary task influences primary task performance.

RESEARCH ON INTERMITTENT NOISE EFFECTS ON AIR FORCE TARGET DETECTION TASKS

Principal investigator: Dr. Norman W. Heimstra, University of South Dakota, Vermillion, South Dakota.

Funds: FY 69—36 months: \$46,452 (15 Sep 69-14 Sep 72).

This project will define noise limits that can be tolerated without impairment of performance. Air Force flight line work subjects operators to intensive noise. Lessened work output and hearing losses result from such noise exposure. This research will identify damaging sound intensities so that the sources can be controlled or the operators shielded from the noise. The project is a systematic

investigation of the effects of variations of on-off ratios of intermittent noise, loudness, individual differences of the human subjects, and task complexity on operator performance. The major objectives will be to define the task conditions under which particular individuals will be affected by differential on/off ratios and intensity levels of intermittent noise. The task selected for use in the proposed investigation will be a target detection task of varying levels of difficulty. The dependent measures will be detection speed (target and non-target) and detection errors including missed or undetected targets and errors of commission. This research will help in the writing of specifications for the noise level control of noisy environments in which Air Force personnel are required to operate. It will focus on the effects of noise on work output and precision. The adoption of ear protectors (or other sound attenuation measures) for personnel in noisy environments might be indicated if the noise causes poor performance even if the noise is not physiologically damaging.

STUDIES OF PREDICTIVE AND ADAPTIVE PROCESSES IN AIR FORCE CONTROL SYSTEMS

Principal investigator: Dr. Charles R. Kelley, Dunlap & Associates, Inc., Santa Monica, California.

Funds: Fiscal year 1969—12 months, \$42,416 (1 Jul 69-30 Jun 70).

This research seeks to provide greater precision and versatility in Air Force manual and automatic control systems. It will examine operator predictive and adaptive processes and their interactions as they occur in control and planning systems. The contribution that these processes make to the system in which they occur will be analyzed. Computer-generated predictive and adaptation models will be mechanized and used as tools for measuring and studying operator performance. Goals of the research will be to improve the use of predictive information to bring about and check system adaptation and to maintain good prediction in the face of changing system or environment. Improved understanding of the processes of prediction and adaptation will make possible improved system operation as a result of improved function allocation, information handling, and training. It will also make possible improved displays, automatic controllers, performance measurement systems, simulators, and training devices.

IMAGE QUALITY AND DETECTION PERFORMANCE OF MILITARY PHOTO-INTERPRETERS

Principal investigator: C. L. Klingberg, The Boeing Company, Seattle, Washington.

Funds: Fiscal year 1969—10 months: \$56,718 (1 Jul 69-30 Apr 70).

This research on aerial photo-interpretation will investigate the physical variables that are most predictive of interpreter performance so that the developing and processing can be optimized to produce photos that are best interpreted. Subjects are AF students at the Lowry photo-interpreter school and Army students at Fort Holabird. The project is designed to relate physical measures of image quality of aerial photographs to image quality as reported by aerial photo-interpreters and to performance levels of the interpreters in extracting information from the imagery. A single summary measure of physical image quality will be developed. This measure should be a valid predictor of interpreter performance. This research will develop recommendations for performance-oriented criteria for imaging systems (aerial photos). It will establish minimal and optimal standards for photo-quality and should be useful in selecting and training aerial photo-interpreters.

CONTROL OF SPEED AND VARIABILITY IN AIR FORCE OPERATOR RESPONSE

Principal investigator: Dr. Raymond S. Nickerson, Bolt, Beranek & Newman, Cambridge, Massachusetts.

Funds: Fiscal year 1969-12 months, \$52,495 (15 Jul 69-14 Jul 70).

This research investigates the speed and variability with which individuals respond to stimuli. It seeks methods for shortening response delays and decreasing response variability. The results will be used in the devising of aircraft instruments so that the displays will enhance operator performance. The effectiveness of various aids to increase the accuracy of synchronization of responses is also being studied.

STUDIES OF THE EFFECTS OF BACKGROUND TEXTURE ON DETECTION OF TARGETS

Principal investigator: Dr. Ronald M. Pickett, Harvard University.

Funds: Fiscal year 1969—12 months, \$16,000 (Oct. 69-Oct. 70).

This research attempts to provide better techniques for identifying objects seen against complex backgrounds as in air to ground detection of targets and in aerial search and rescue. It is an attempt to quantify texture, as a visual parameter and cue, in terms of mathematical-statistical models. A major visual cue which enable observers to detect targets against a cluttered background is the texture dimension, for example, targets embedded in a jungle canopy. These models are being used to produce definable-controllable textures for use in visual discrimination tasks. Results will assist in understanding factors involved in the recognition and detection of targets, in developing techniques of searching for such targets, and in the design and use of aids to aerial search.

MECHANISMS FOR IMPROVING HUMAN VISUAL SKILLS IN AIR FORCE TASKS

Principal investigator: Dr. Wilson P. Tanner, University of Michigan, Ann Arbor. Michigan.

Funds: Fiscal year 1969—24 months, \$108,144 (1 July 69-30 June 71).

This research will extend operator capabilities in AF signal detection tasks. It consists of a series of basic studies designed to advance our understanding of sensory and decision processes in the context of signal detection and interpretation-tasks. In broad prespective the research will identify and quantify facets of the signal detection process which can be exploited to extend human performance capability in man-machine sensing systems. The research will focus on the following problems: (a) What are the subtle cues, methods of operation and sensory/decision factors that differentiate "expert" observers from less proficient novices? How can the acquisition of such attributes be facilitated? (b) To what extent can signal detection performance be enhanced by the simultaneous use of two sensory modalities (e.g. hearing and sight)? (c) What determines the amount of time involved in processing sensory data and making effective decisions concerning that data. The research will be conducted in the framework of the theory of signal detectability which was developed by the principal investigator.

Unit Effectiveness Research

PERSUASIVE COMMUNICATION IN FUNCTIONAL ORGANIZATIONS

Principal investigator: Dr. Harold H. Kelley, University of California, Los Angeles, California.

Funds: Fiscal year 1969—19 months, \$37,733 (1 Aug. 68-28 Feb. 70).

The objective of this research is to determine experimentally the factors that contribute to (or interfere with) the successful resolution of conflicting issues between competing but interdependent groups of people. Studies will focus on various strategies and communication methods used in reaching agreement between groups. Variables to be studied include the mode of communication, whether oral or written, face-to-face communication vs remote contacts and the effects of implied threats on the degree to which mutually satisfactory agreements are reached. The effectiveness of large organizations (such as the Air Force) hinges directly on the contributions and continued loyalty of individual groups members and subgroups at all echelons. The very nature of large organizations places subgroups in competition with each other (e.g., for status, funds, areas of responsibility, etc.) and the issues between these competing subgroups must be resolved in ways which do not alienate the competing groups. In isolating and studying the variables involved in tension reduction between groups. a contribution will be made to over-all organizational effectiveness. It will also be possible to apply the results of this effort in training programs for Air Force personnel who will work with foreign nationals.

SOCIAL RESEARCH AND MILITARY MANAGEMENT

Principal investigator: Dr. Roger Little, Inter-University Seminar on Armed Forces and Society, Inc., Wilmette, Illinois.

Funds FY-69-24 months, \$31,000 (1 Jul 67-30 Sep 69).

The purpose of this research was to make available for use the results of a substantial amount of behavioral and social science research on military institutions conducted since the close of World War II. A recognized authority familiar

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with the work that has been accomplished in seventeen subdivisions of the field of military management collected relevant findings and assembled them in a form that should facilitate use by military agencies. This work has been published and copies have been forwarded to DDC from which source they should be available to military users. Additional use is being derived through consultation, seminars and lectures conducted by participants with military personnel.

ANALYSIS OF STRESS EFFECTS ON MILITARY PERFORMANCE

Principal investigator: Dr. Joseph E. McGrath, Department of Psychology, University of Illinois, Urbana, Illinois.

Funds: FY 69-24 months: \$65,994 (1 Jun 69-31 May 71).

This research will provide information to improve personnel selection and training procedures for Air Force and other military units which must perform their duties under conditions of unusual psychological stress. The Air Force lacks adequate predictors for performance under forms of psychological and social deprivation such as those resulting from isolation of personnel and units serving in unusual foreign situations, isolated missile sites, captivity or detention situations, etc. The objective of the research is to produce a systematic framework for understanding the social and psychological sources and effects of stress upon the performance of military units. The investigator has developed a new approach for relating the important variables of social stress such as: time of occurrence and duration, effect of individual differences in people for coping with stress, the situation in which stress occurs and a possible measurement scale for relating stressor conditions and stress reponses.

COMPARATIVE STUDY OF CONTROL AND FEEDBACK TECHNIQUES APPLICABLE TO AIR FORCE SYSTEMS

Principal investigator: R. W. Obermayer, Bunker Ramo Corp., Canoga Park Calif.

Funds: FY 69-\$63,812, 12 months (1 July 1969-30 June 1970).

This research study is relevant to the development of Air Force and other Department of Defense command and control systems. It will contribute to the design of self-adaptive, automated communication and control networks. This is being done by comparing U.S. and foreign trends in the application of cybernetic control and feedback principles to the development of man-machine control systems and self-adaptive devices and processes. The first stage of the study concerns the overall aspects of control and feedback theory and its application to control systems. The focus will then shift to an analysis in depth of selected self-adaptive systems, a review of mathematical models and simulation techniques describing them, and the determination of the implications of their development and extension to possible large-scale communication and organizational control networks.

RESEARCH ON MEASUREMENT AND CONTROL OF RESPONSE TO STRESSFUL SITUATIONS

Principal investigator: M. T. Orne, Pennsylvania University Hospital, Philadelphia, Pennsylvania.

Funds: FY-69-\$73.528, 24 months (1 Feb. 69-31 Jan 71).

This research focuses on human performance and self-control in military jobs that involve extended duty hours, long periods of vigilance, continuing demands for attention to detailed information and activities carried out in unusual and debilitating environments, Experiments are being conducted on human reactions and physical response mechanisms of human operators in situations involving uncertainty, tension induced by the complexity and duration of tasks and through anxiety created by the physical and psychological setting in which the subject works. In past studies, this investigator has found that reliable physiological indicators accompany different states of arousal and attention on the part of subjects. He has also found that these indicators and the underlying state of the organism can be controlled by trained human subjects. The investigator is now developing methods for the use of established self-control mechanisms as a means for resisting the manifestations of tension and auxiety and as a way to increase tolerance for stress. The results of this research will be directly applicable to the improvement of established training courses that prepare Air Force personnel to resist enemy interrogation, enhance their chances for survival, and assist them in safe-guarding military information in the case of their capture by hostile forces. The findings will also be useful in determining work and rest schedules. length of tours, and physical and psychological factors conducive to reliable performance in stressful environments.

POLITICAL FUNCTIONS OF THE MILITARY IN THE MIDDLE EAST AND NORTH AFRICA

Principal investigator: Dr. Amos Perlmutter, Operations & Policy Research, Inc., Washington, D.C.

Funds: FY-69-12 months, \$42.942 (1 Jan 69-28 Feb 70).

This investigator has identified some of the effects of the political involvement of military officers in the governmental affairs of the nations of North Africa and the Middle East. He has compared the level of professionalism with the degree of political involvement that characterizes the behavior of military leaders. He has also investigated the ways in which officers account for past failures and the manner in which combat experience is used in planning, training and preparation for future operations. This study is providing information relevant to U.S. military planning, military assistance and foreign training programs.

SIMULATION STUDIES OF COMMUNICATIONS BEHAVIOR UNDER STRESS OF STRANGE ENVIRONMENTS

Principal investigator: Dr. E. L. Quarantelli, Ohio State University Research Foundation, Columbus, Ohio.

Funds: FY-69-12 months, \$43,403 (1 Feb 69-31 Jan. 70).

This research is relevant to Air Force training programs that prepare personnel for foreign duty assignments, military assistance programs and special operations involving cooperation with citizens of the host country. The terminal phase of the research involved cross-cultural factors in problem solving and methods for eliciting cooperation from foreign military counterparts. The work focused on effective communication through language and cultural barriers. The investigators have assisted in the evaluation of the curriculum for an Air Force course to train officers for overseas assignments, and they have coordinated their research with the Training Division of the Human Resources Laboratory. They have provided consultation to the Air Force Special Air Warfare Center that prepares officers for service in Vietnam and other world areas.

CRITERIA FOR THE DESIGN OF NEW FORMS OF ORGANIZATION

Principal investigator: Dr. Howard M. Vollmer, Stanford Research Institute. Menlo Park, California.

Funds: FY-69-12 months, \$68,336 (1 Dec 68-28 Feb 70).

This research will result in the production of a manual for military managers. This handbook will assess the factors that control the effectiveness of organizations designed to accomplish specialized missions and adjust to the demands placed on organizations by changing technology and evolving mission requirements. The investigator observed and recorded the ways major organizations respond to change, developed a number of analytical case studies, and is preparing interpretive findings of use to military and civilian managers.

DETAILS OF PROPOSED FY 70 AND FY 71 PROGRAMS

PERSONNEL AND MANPOWER RESEARCH

RESEARCHING IN MATHEMATICAL AND COMPUTER BASED METHODS OF SIMULATING AIR FORCE PERSONNEL SYSTEMS

Principal investigator: R. Hatch, Decision System Associates.

Funds: FY-70: \$50,000, FY-71: \$60,000, 24 months.

This research is directed toward the identification and correction of deficiencies in computer programs that provide models of the Air Force Personnel System. It investigates mathematical and computer-based methods of simulating the structure of the Air Force personnel system, and the changes which occur within the structure as a function of modifications to personnel management policies. The research effort will identify those factors in current methodology which impose limitations on the realistic simulation of the Air Force personnel system. The objective of the research will be to develop means of resolving these problem areas, and to appraise the benefits associated with various approaches. This contract effort will provide information required to develop a system for simulating the personnel force at critical transition points, including recruitment, initial training, assignment, recollistment, overseas deployment, cross-training, and reassignment. This research is in direct support of the exploratory development program of the Human Resources Laboratory, AFSC.

In FY 70 this research will focus on an investigation and comparison of alternative simulation procedures for optimizing personnel allocations. The current research effort has demonstrated that the "decision index approximation" method does not yield the best distribution of available manpower and has also identified the proposed alternative methods to be evaluated. Direct comparisons of these methods as well as research on optimization procedures involving multiple objective functions will be investigated in FY 70 and 71.

OPTIMIZATION OF PERSONNEL ASSIGNMENT PROCEDURES

Principal investigator: Undetermined.

Funds: FY-70: \$50,000, FY-71: \$35,000, 24 months.

This research will adapt the optimization techniques of mathematical statistics, operations analysis, and engineering to the management and assignment of Air Force personnel. Products will be used by the AFSC Human Resources Laboratory.

DEVELOPMENT OF IMPROVED TECHNIQUES FOR PREDICTING PERFORMANCE OF AIR FORCE PERSONNEL FROM APTITUDES, INTERESTS, PRIOR EDUCATION, AND EXPERIENCE

Principal Investigator: Undetermined.

Funds: FY-70: \$77,000, FY-71: \$50,000, 24 months.

This research will improve Air Force classification methods by providing new measures of pre-military interests, prior education, and vocational experience. Scores on these measures when combined by optimal weighting with aptitude test battery scores will provide classification guidance to optimize assignment and minimize training. This research will provide basic support for the work of the AFSC Human Resources Laboratory.

TRAINING AND EDUCATION RESEARCH

FLYING TRAINING RESEARCH

Principal investigator: Dr. S. Roscoe, University of Illinois.

Funds: FY-70: \$145,000, FY-71: \$85,000, 24 months.

This research will include four major divisions: (1) Development of objective pilot proficiency measures to provide guidance for individual pilot training by assessing trainee flying competence in order to correct deficiencies and to determine qualification for graduation; (2) Research on stress and fear of flying as causes for failure; (3) Determination of the minimum necessary cues required for aircraft landing so that flying trainees can be selected who are capable of using these cues; and (4) Development of optimal imaging techniques to improve flight simulators as realistic training devices. This research is of greatest significance to the Air Training Command and to the AFSC Human Resources Laboratory.

TRAINING IN PROBLEM SOLVING TECHNIQUES FOR AIR FORCE OFFICERS

Principal investigator: Dr. Calvin Taylor, University of Utah, Salt Lake City, Utah.

Funds: FY-70-12 months, \$20,000.

This research investigator will abstract the principles from previously accomplished research on creativity and problem solving and develop them into a form suitable for use in the professional education programs of the Air Force. The researcher will review the curricula and study units of the Squadron Officer School, the Command and Staff School, the Academic Instructor and Allied Officer School and the Institute for Professional Development at the Air University in order to determine the best methods for the utilization of knowledge on trainable skills in decision-making. Most research on creativity has been aimed at the primary and high school student, not at mature persons undertaking responsible positions as managers. This effort will fill this gap and supply material that can be used in existing courses to increase their effectiveness without additional requirements for time or money. The chief of the Professional Education Division of the Air Force Human Resources Laboratory will monitor this effort and facilitate the use of the results.

VALIDATION OF CURRICULA CONTENT OF AIR FORCE TECHNICAL TRAINING COURSES

Principal investigators: Undetermined.

Funds: FY-70: \$60,000, FY-71: \$60,000, 24 months.

This research will devise techniques to determine what tasks airmen actually perform on the job and how these match the content of training curricula. Results will be significant for the Air Training Command and for the AFSC Human Resources Laboratory.

RESEARCH ON NATURAL LANGUAGE COMPUTER-AIDED INSTRUCTION FOR AIR FORCE TRAINING PROGRAMS

Principal investigator: Dr. Harry Silberman, Systems Development Corporation.

Funds: FY 70-\$90,000, FY 71-\$100,000 24 months.

Computer-assisted-instruction (CAI) offers many advantages and potential efficiencies in Air Force training programs. The major technical deficiency limiting the application of this technology in Air Force training programs is the lack of a capability for trainees to interact with a CAI system in unrestrained natural language. The objective of this research is to develop the principles and programming techniques which will permit an Air Force trainee to query and respond to a computer in relatively unrestrained English. The specific focus of the research will be to develop and demonstrate the rules necessary to translate a student's answer to a question into a logical structure that can be "understood" by the computer and related to stored information about the appropriate answer. In essence, the research will attempt to enhance a computer's ability to "understand" paraphrasing. A breakthrough in this area will result in enormous savings to the Air Force in terms of better training, reduced training time and training costs as well as fewer personnel tied up in the training pipeline.

The research will have progressed to the point of having operational on the UNIVAC 1108 by mid 1970, an experimental natural English CAI system that teaches meteorology. This system will possess the necessary linguistic processing capability to correctly recognize a wide range of synonymous constructed response answers (as opposed to multiple choice answers) as being equivalent paraphrases of the correct answer to a question. In so doing the computer will allow the Air Force trainee a significantly increased flexibility to communicate with the muchine in natural English. There will be several important unknowns about this system, e.g., 1) the number of students it can service simultaneously, 2) its response time, 3) the optimal memory size, and 4) the optimal depth of linguistic processing. In FY 70, 71, rigorous and systematic experimentation to resolve these questions will be undertaken.

THEMIS EXTENSION

THE EFFECTS OF ISOLATION ON HUMAN PREFORMANCE

Principal investigator: Dr. Donald Forgays, University of Vermont.

Funds: FY-71, \$100,000 (Terminal funding).

Many Air Force crewmembers are required to perform their missions under stressful and isolated conditions. For example, underground ICBM control centers; remote radar sites; Arctic and tropical climatic conditions and confinement as prisoners of war. This project is designed to study individual differences in the influence of severe isolation upon psychological and physiological functioning and also to use the isolatory environment as a medium in which to study other aspects of human behavior. The results of this research on stressful environments will prove useful in creating Air Force Human Engineering and Biomedical support criteria; personnel planning information; training; closed-system environmental control, and air crew work/rest cycle data presently not available. Specific study areas will include 1. The differential effects of water immersion isolation versus air isolation; 2. Influence of attitude and personality characteristics on isolation effect; 3. Physiological changes associated with duration and type of isolation; 4. The effects of isolation on attitudes; 5. Vigilance performance and sensory acuity under isolation conditions; 6. Study of retention, stereosis sensory coding, and fear reduction as affected by the isolatory environment. This research is directed toward understanding the effects of isolation from normal

sensory experiences on human performance capability and physical well-being. Various performance and physiological measures will be obtained under conditions of air and underwater isolation.

HUMAN ENGINEERING RESEARCH

STUDIES OF PREDICTIVE AND ADAPTIVE PROCESSES IN AIR FORCE CONTROL SYSTEMS

Principal investigator: Dr. Charles R. Kelley, Dunlap and Associates, Inc., Santa Monica, California.

Funds: FY 70, \$45,000, 12 months (1 July 70-30 June 71); FY 71, \$45,000, 12 months (1 July 71-30 June 72).

This research seeks to provide greater precision and versatility in Air Force manual and automatic control systems. It will examine operator predictive and adaptive processes and their interactions as they occur in control and planning systems. The contribution that these processes make to the system in which they occur will be analyzed. Computer-generated predictive and adaptation models will be mechanized and used as tools for measuring and studying operator performance. Goals of the research will be to improve the use of predictive information to bring about and check system adaptation and to maintain good prediction in the face of changing system or environment. Improved understanding of the processes of prediction and adaptation will make possible improved system operation as a result of improved function allocation, information handling, and training. It will also make possible improved displays, automatic controllers, performance measurement systems, simulators, and training devices.

This is a continuation of research initiated in FY 69. In the FY 70 funding period the predictive-adaptive model of the human operator of a manual control system (model developed in FY 69) will be tested as a tool for measuring operator performance in predicting and adapting to changing system procedures and different environments. During the terminal (FY 71) funding period the investigator will relate test results of the predictive-adaptive model to determining the effects of improved versus degraded predictions on the performance of typical control, planning and decision making operations.

THE EFFECTS OF ENVIRONMENTAL EXTREMES ON PERFORMANCE ON MILITARY TASKS

Principal investigator: Dean Ralph Nevins, Kansas State University.

Funds: FY-71: \$100.000 (Terminal funding).

This project THEMIS research is an interdisciplinary investigation of the effects of extreme environments on human performance on military tasks. It focuses on militarily significant problems of life support under varied ventilation and heat conditions. It collects data on the effects of physical environmental changes such as are encountered in military operations and on physiological functions and bodily rhythms. The project will contribute to the design of equipment to provide military work environments that will not detract from the effectiveness of work performance. Examples of the kinds of environments that are stressful and that may be improved are aircrew compartments, submarine work space, and ground and airborne command and control stations. This research will be conducted by an interdisciplinary team of engineers and life scientists. The program includes studies of, 1. the use of localized ventilation to maintain the subjects' ability to perform in stressful environments, 2. the distribution of air in confined spaces, 3. human performance in altered environments, 4, physiological and behavioral rhythms in altered environments, 5, resistance to heat stress, 6, microflora growth in footwear, and 7. comparative psychophysiology in extreme environments.

CONTROL OF SPEED AND VARIABILITY IN AIR FORCE OPERATOR RESPONSE

Principal investigator: Dr. Raymond S. Nickerson, Bolt, Beranek and Newman, Cambridge, Massachusetts.

Funds: FY 70. \$55,000, 12 months (15 July 70-14 July 71); FY 71, \$55,000, 12 months (15 July 71-14 July 72).

This research investigates the speed and variability with which individuals respond to stimuli. It seeks methods for shortening response delays and decreasing response variability. The results will be used in the devising of aircraft instruments so that the displays will enhance operator performance. The effectiveness of various aids to increase the accuracy of synchronization of responses is also being studied.

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This is a continuation of research initiated in FY 69. In the FY 70 funding period the investigator will emphasize the development of training aids or cues for a more rapid coordination by the human operator of warning signals and motor responses. The specific nature of the work to be accomplished in FY 71 will be predicated on the results of the FY 70 program and cannot be forecast at this time.

FLIGHT DISPLAYS AND CONTROL DYNAMICS

Principal investigator: Undetermined.

Funds: FY-70: \$49,000, FY-71: \$40,000, 24 months.

This research will seek to organize the cockpit display and control response complex into a configuration that will simplify the tasks of flying aircraft. The results will be used by the AFSC Human Engineering Division and the Flight Dynamics Laboratory.

CREW WORKLOAD FORECASTING AND MAN-MACHINE FUNCTIONS ALLOCATION IN AIR FORCE SYSTEMS (PROJECT 7183)

Principal investigator: Undetermined. Funds (proposed): FY 70—\$20,000.

To insure the effectiveness of the man/machine interface in an aerospace system under development (and to do so without recourse to expensive retrofit) it is essential to be able to accurately forecast the workloads that will be imposed on crew member(s) by various system design alternatives. A variety of preliminary techniques for forecasting crew workload have been developed. This research effort will provide an evaluation and refinement of the existing techniques and will integrate them in a reference document that will serve as a guide to system designers. This effort will include: (1) a review of current practices and problems in allocating man-machine functions and distributing crew workload during the design, development, and testing of advanced systems; (2) a review and evaluation, including an annotated bibliography of supportive research, of the state-of-the-art in workload measurement; and (3) the development of criteria and general guidelines to support human engineering personnel in selecting and applying workload measurement techniques and data during the development of Air Force systems and in planning and conducting related research. The results of the effort will be integrated into a documentary report suitable for use as a convenient reference.

RESEARCH ON HEAD MOBILITY, STABILITY AND ORIENTATION PRECISION AS RELATED TO HEAD AIMING DEVICES

Principal investigator: Undetermined. Funds (Proposed): FY 71—\$45,000.

Efforts are currently underway to develop weapons that are aimed by a simple orientation of the head toward the target. While there are many potential advantages to such systems, additional basic information about the human head as an aiming device must be obtained if the full potential of such devices is to be realized. This research will define the mobility envelope of the head, the speed and precision of head positioning (aiming) and the stability of the head in maintaining a fixed or tracking orientation.

EFFECTS OF OPTICAL FILTERS ON TARGET DETECTION PERFORMANCE UNDER DIFFERENT LEVELS OF ILLUMINATION AND CONTRAST

Principal investigator: Undermined.

Funds (Proposed): FY 70-\$25,000; FY 71-\$15,000.

Forward Air Controllers in SEA were issued yellow filter goggles on the basis of their subjective impression that their visual capability was improved when using the goggles. Currently available objective evidence indicates that such filters would be useful only under conditions of extremely high illumination levels and might possibly be useful at lower levels of illumination depending on the light spectrum filtered out and the prevailing colors and contrasts between target and surround that prevail in the field of search. Very little is known about the latter filter/search area characteristic interaction. This research will seek to determine if visual capabilities can be enhanced by the selective application of optical filters under conditions of different prevailing colors and contrast ratios in the search area.

RESEARCH ON THE INTERACTION OF ILLUMINANT COLOR, ILLUMINATION LEVEL AND ATMOSPHERIC CONDITIONS ON VISUAL TARGET DETECTION

Principal investigator: Undermined.

Funds (Proposed): FY 70—\$40,000; FY 71—\$30,000.

Close air support in night operations requires the use of flares to permit visual identification of targets. Experience in SEA indicates that target detection performance under flare illumination is less than would be obtained under normal daylight conditions. This proposed research is designed to derive basic visual data from which an advanced, more effective flare technology can be developed. The research will focus on the interaction of illuminant color, illumination level and atmospheric conditions (e.g., haze, rain, clear) as determinants of target detection ability.

UNIT EFFECTIVENESS RESEARCH

COMPARATIVE STUDY OF CONTROL AND FEEDBACK TECHNIQUES APPLICABLE TO AIR FORCE SYSTEMS

Principal investigator: R. W. Obermayer, Bunker Ramo Corporation, Canoga Park, California.

Funds: FY 70—\$30,000, 12 months (1 July 1970—30 June 1971); FY 71—\$30,000, 12 months (1 July 1971—30 June 1972).

This research study is relevant to the development of Air Force and other Department of Defense command and control systems. It will contribute to the design of self-adaptive, automated communication and control networks. This is being done by comparing U.S. and foreign trends in the application of cybernetic control and feedback principles to the development of man-machine control systems and self-adaptive devices and processes. The first stage of the study concerns the overall aspects of control and feedback theory and its application to control systems. The focus will then shift to an analysis in depth of selected self-adaptive systems, a review of mathematical models and simulation techniques describing them and the determination of the implications of their development and extension to possible large-scale communication and organizational control networks.

This is a continuation of research initiated in FY 69. During the FY 70 funding period, the contractor will conduct a computer simulation test of an advanced model of a foreign feedback and self-adaptive control system to determine its usefulness for large-scale communication and organizational control networks. The specific nature of the work to be accomplished in FY 71 will be predicated on the results of the FY 70 program and cannot be forecast at this time.

RESEARCH ON MEASUREMENT AND CONTROL OF RESPONSE TO STRESSFUL SITUATIONS

Principal investigator: M. T. Orne, Pennsylvania University Hospital, Philadelphia, Pennsylvania.

Funds: FY-71: \$35,000, 12 months (1 Feb 71-31 Jan 72).

This research focuses on human performance and self-control in military jobs that involve extended duty hours, long periods of vigilance, continuing demands for attention to detailed information and activities carried out in unusual and debilitating environments. Experiments are being conducted on human reactions and physical response mechanisms of human operators in situations involving uncertainty, tension induced by the complexity and duration of tasks and through anxiety created by the physical and psychological setting in which the subject works. In past studies, this investigator has found that reliable physiological indicators accompany different states of arousal and attention on the part of subjects. He has also found that these indicators and the underlying state of the organism can be controlled by trained human subjects. The investigator is now developing methods for the use of established self-control mechanisms as a means for resisting the manifestations of tension and anxiety and as a way to increase tolerance for stress. The results of this research will be directly applicable to the improvement of established training courses that prepare Air Force personnel to resist enemy interrogation, enhance their chances for survival, and assist them in safe-guarding military information in the case of their capture by hostile forces. The findings will also be useful in determining work and rest schedules, length of tours, and physical and psychological factors conducive to reliable performance in stressful environments.

INFORMATION PROCESSING AND UNCERTAINTY AS FACTORS IN AIR FORCE ORGANIZATIONAL EFFECTIVENESS

Principal investigator: Dr. Jay Galbraith, Alfred P. Sloan School of Management, Massachusetts Institute of Technology, Cambridge, Massachusetts. Funds: FY-70—\$48,000, FY-71—\$75,000.

This is an investigation of the structure and process of complex organizations. This type of study has been successfully pursued in some large industrial organizations. The work is directed toward an analysis of the flow of information in military organizations as a consequence of the unpredictability characterizing specific organizational tasks. The results of this research will be used to develop organizational procedures that are appropriate to the class of tasks that constituted the organizational mission. Communication and procedural arrangements will be observed in a number of military organizations having a common mission such as repair and maintenace of jet aircraft propulsion systems. Difference in mission performance will be analyzed in terms of the degree of uncertainty in regard to control of essential inputs as this interacts with the volume and type of communication found in these organizations. Prior research by this investigator in the Boeing Aircraft Corporation and that of other investigators will be drawn upon to provide the analytical matrix for relating uncertainty and communication flow to effective performance. This work will be conducted in collaboration with the Personnel Research Division of the Humane Resources Laboratory. Implementation of the findings will occur during the course of the research to a limited extent and the principles having general applicability will be available at the conclusion of the efforts. The investigator will advise a number of relevant Air Force management teams and educational programs on the utilization of his research findings.

STUDIES OF RESISTANCE TO STRESS ASSOCIATED WITH COMBAT OPERATIONS, CAPTIVITY AND RESTORATION TO SERVICE OF AIR FORCE PERSONNEL

Principal investigator: Undetermined. Funds: FY-70: \$40,000, FY-71: \$40,000.

This research will evaluate the personal characteristics, training programs and organizational factors that contribute to effective resistance of military personnel to the potentially degrading effects of combat operations and captivity. It will also be concerned with the development of means to sustain high individual motivation and strong organizational morale under adverse environmental and situational conditions. The results of these studies should be in a form suitable for Air Force training programs dealing with resistance to stress and countering enemy attempts at exploitation during captivity. They should also be useful as a source of guidance in the rehabilitation of personnel returned from enemy custody.

INSTRUMENTATION LABORATORY

Senator McIntyre. You mention, General, that the only example during the past year of where Air Force research programs have come under attack was at MIT's Instrumentation Laboratory. What have you done specifically about the program at that location!

General Glasser. I don't recognize that as a statement that I

made.

Mr. Fine. It was in one of the two prepared statements.

General Glasser. I would like to add that MIT is not the only place that has come under attack. I can think immediately of Stanford which has had an even worse problem; of course, this occurred prior to last year's hearing.

To the sense of the question, what have we done about it? First of all, it has not gone out of existence. At this point, there is a substantial effort underway with the MIT authorities looking at what we can do and what we should do in this area.

I had a conversation just a week ago with Dr. Al Hill, vice president, MIT, in charge of the special laboratories, who was very confi-

dent that MIT will be able to reach an agreement with the dissidents that will allow us to continue the fundamental programs that we have, and that we will be able, through the industrial associates of the laboratory to pick up those more immediate weapon applications. We anticipate, if things go as he now thinks they will go, that there will be no loss to our programs involved. Do you have further comments on that, Mr. Secretary?

Mr. Hansen. I think you have covered that very well.
Senator McIntyre. You state that policy planning studies, formerly carried under behavioral and social sciences, now are included under the studies and analyses program. Will you identify by project, task, and amount each of the items included in your fiscal year 1969, 1970, and planned 1971 studies and analyses program? Include title and brief statement of objectives.

That is for the record, please. (The information follows:)

PROGRAM ELEMENT 6.5103F, STUDIES AND ANALYSES PROJECT: THE USAF POLICY PLANNING STUDIES PROGRAM—FISCAL YEAR 1969

I. STUDY PROJECT

"Trends in Western European Political, Economic and Defense Policies, 1969-85, and Implications for U.S. Security and Strategy" (Battelle Memorial Institute).

Cost.-\$220,000.

Objectives.—The study has two principal objectives: first, to determine the likely degree of Western Europe's cohesion or disunity and its foreign/defense policy favor towards the United States by 1985; second, to analyze the implications of the study's findings for United States security and strategy during the period 1969-85. The study is designed to support the strategic environment section of USAF Planning Concepts and all levels of strategic planning.

II. STUDY PROJECT

"Japanese Security Posture and Policy, 1970-80" (Stanford Research Institute).

Cost.-\$190,000.

Objectives.—This study will encompass historical perspectives dating from World War II and current trends and projections over the period 1970-80. It will include the projection of a series of alternative futures for Japan, for 1980, from which the most plausible composite future will be derived. This composite future will include a delineation of Japan's power capabilities and the thrust of its foreign and military policies. Projections that present a severe threat to the United States, although less likely to occur, will also be portrayed for further consideration. These futures will be analyzed in terms of their effects on U.S./Japanese relations and the U.S. posture in Asia, to provide a basis for developing concepts relevant to USAF strategic planning and force posturing.

III. STUDY PROJECT

"Regional Integration in Asia: Its Propects and Implications" (Bendix Aerospace Systems Division).

('ost.-\$168,604.

Objectives.-The principal objectives to which this study is directed are to identify: (1) the nature and the extent to which regional integration has occurred in non-Communist Asia since the end of World War II; (2) the relationship of regional integration to the development of regional organizations: (3) the nature, role and intra- and inter-state relationships these regional organizations have exhibited; (4) the trends for both Asian regional integration and the development of Asian regional organizations; and (5) the implications such trends may have for future U.S. relations with the regional organizations themselves and with the individual member countries of such organizations. The final task will take study projections and attempt to put them in the perspective

of what implications they will have for the U.S. Air Force in the 1970's. This study has been designed to support the strategic environment section of the USAF Planning Concepts and other levels of long-range strategic planning.

IV. STUDY PROJECT

"The Empirical Development of the Prototype Environmental Information System" (General Electric—TEMPO).

Cost.—\$194,174.

Objectives.—The objective of this study is to develop an operational forecasting capability by providing projections of future patterns of power and influence, internal instability, local conflicts and alignments. It is intended to provide a supplemental capability for the preparation of the Strategic Appraisal and Basic Considerations in the Development of Strategy and USAF Concepts-Parts II and III of USAF Planning Concepts. The study is designed to improve

the means of forecasting future environments/conflicts.

Fiscal year 1970-71 plans.—The currently programmed FY 70/71 funds (\$348,-000/300,000) are to support policy-oriented studies sponsored by the Department of State, of mutual interest and benefit to the Air Force and the Department of State, with the objective of providing improved analytical support for policy review and long-range planning purposes. The Air Force will support those projects incident to national security problems, future environments, strategic concepts and improved analytical techniques that have an immediate relevance to Air Force missions and requirements. The objective of this effort is that of developing an R&D capability within the Department of State upon which the Air Force can draw in the future. Detailed management and contracting will be the responsibility of the Department of State. Air Force participation will be limited to providing assistance during the development of individual study research designs, in monitoring study progress and in the utilization of final study reports. The detailed terms of reference and a list of candidate studies are currently being developed.

APPLICATION OF FUNDS TO NON-DEFENSE PROGRAMS

Senator McIntyre. Regarding your exploratory development program in environment, you mention that "Despite the direct military purposes of this research, it also offers potential understanding of atmospheric dynamics that may find application in work on such problems as pollution and environmental control." Recently, Senator Proxmire appeared before the Research and Development Subcommittee in connection with S. 3003 on independent research and development and was critical of the use of Defense funds for nondefense purposes, such as pollution control. Are you saying that we are using directly contracted R.D.T. & E. funds for such non-defense purposes?

Mr. Hansen. No, sir. I don't believe that is true at all. The Air Force is interested in pollution control because we are generators of pollution, and we are charged down through the administration with the job of paying attention to this problem and trying to do something

about it.

And so through our propulsion laboratories and our propulsion contractors we are trying to do work that cleans up the exhaust of airplanes. Through our civil engineering efforts we are trying to avoid polluting water.

We have a project which I reviewed just the other day that had to do with cleaning up the waste water out of photo processing laboratories, so that we don't throw those chemicals into the waste water.

The statement you made was generated intending to say that those which we have to study about the atmosphere and the environment, for purposes of supporting our programs which operate in that environment, have a fallout of information which we believe will be useful in connection with understanding the pollution problems of our environment, and seeking and finding solution to those problems. To my knowledge we have no project which does not have as its fundamental, basic and justifying requirement the fact that this is information that we need to know about our environment in order to operate in it and fly through it.

WESTERN TEST RANGE BUDGET REQUEST

Senator McIntyre. Will you explain the increase of \$4 million requested for the Western Test Range? This program has increased from \$58.5 million in fiscal year 1969 to \$63.5 million in fiscal year 1970 and now \$67.5 million for fiscal year 1971. When will it level off?

I put the question, "when will it be reduced?"

Mr. HANSEN. I believe that this is the money for the facilities which we need to be able to measure the accuracy of the [deleted] MINUTE-MAN III.

General Glasser. Yes; we have been transferring more and more of our efforts from the Eastern Test Range to the Western Test Range. This coming year of fiscal year 1971 will see the last of the Air Force ballistic missile test programs out of the ETR. There will still be Navy programs, there will still be satellite programs, but by and large we have been gradually, over the last few years, consolidating all of our ballistic missile activities at the Western Test Range. This in large measure accounts for the increases that you have seen out there.

The answer is that the Western Test Range results will level off, and level off reasonably soon, but not until we have had an opportunity to bring in all of the features that were previously spread between both of them. This in turn should offer opportunities which the Air Force is examining very carefully regarding future reductions at ETR.

If we were to look in parallel here, you would see that during the same time period that you have been describing increases at WTR, there have been much larger decreases, offsetting decreases at the Eastern Test Range. General Ferguson is conducting studies currently to further reduce the ETR programs, and perhaps in the not too distant future it is conceivable that they can be eliminated from the Air Force's budget.

(Off the record.)

Mr. Hansen. I overheard your comment. I might give you some information if you would like.

Senator McIntyre. There are too many questions to add anything

to it. We will be going into that hopefully.

The question is the test ranges. If you will remember last year's report, we kept looking at them and looking at them, but the General you sent over to talk about them was too good. He knew all the answers and he had all the answers and so we abandoned our efforts to try to cut the test ranges. We felt that all of them somehow could be reduced.

General Glasser. Could we have his name, sir? We will bring him

Senator McIntyre. I don't know who he was. He was a very fine officer and we brought him back twice. I don't know who he was. You see the problem is, as far as I am concerned that there don't seem to be any uniformity.

(Off the record.)

Senator McIntyre. Since the Air Force is now out of the man in space business with the demise of the MOL, are you requesting any funds in fiscal year 1971 to support such efforts under bioastronautics or any other program?

Mr. Hansen. No, we are not.

BASE CLOSURES

Senator McIntyre. The Secretary of Defense recently announced a major base closure plan which will have a significant effect on the DOD fiscal year 1971 program. Are any of these reductions to be made in Air Force activities financed from the R. D. T. & E. appropriation? If so, will you identify the specific locations, program elements affected, numbers of civilian and military positions and man-year equivalents to be reduced and the estimate of funds which may be deleted from your fiscal year 1971 budget?

General Glasser. There are activities, bases that are currently financed in the R. D. T. & E. accounts, and we will supply these details for the record. I am not certain regarding reductions from the R. D. T. & E. account. Because most of them are consolidations on other bases, you will lose the overhead amount, but the direct labor accounts, if

you will, will continue on at a different base.

(The information follows:)

In the recently announced base closure plan, none of the Air Force bases scheduled to be closed is financed by the RDT&E appropriation. The changes being instituted within RDT&E include manpower and personnel reductions at various locations within Air Force Systems Command. The manpower reductions will be completed by the end of FY 1971.

The FY 1971 Budget reflects a reduction of 1,253 manpower authorizations

and the associated dollars.

EFFECT OF SECTION 403

Senator McInter. Section 403 of the fiscal year 1970 Military Procurement Authorization Act provided that payments for independent research and development, bid and proposal, and other technical effort would be limited to 93 percent of the total amounts planned for these purposes. Although our Ad Hoc Subcommittee on Research and Development is holding separate hearings on this subject and will have Dr. Foster appear as a witness, each of the services should have an opportunity to comment since it impacts largely on their procurement appropriations. Would you answer the following questions?

(a) What has the Air Force done to implement section 403?

(b) Have you had an opportunity to review the GAO report and, if so, would you care to comment on it?

Do you want to do that for the record or do it now?

Mr. Hansen. Either for the record or now as you choose.

Senator McIntyre. Do it now because anything I learn I will be able to use tomorrow.

Mr. Hansen. Your first question is what have we done to comply with the law. The Secretary of Defense has caused to have issued under his authority defense procurement circular No. 75, which issues instructions out to the field. Paraphrased it says determine what you

would have allowed without the law and then only allow 93 percent of that.

We really don't know what else we can do. This is a very difficult thing to adjust to. Now you mentioned that Dr. Foster is going to appear before the R. & D. subcommittee tomorrow, and I have read his statement. I think it is a very good one. He proposes in there a program which I think is entirely adequate and is all that should be done. In fact it is my personal view that it is a little more than should be done, but it certainly takes care of what I believe are the concerns.

I would like to say there are a number of things about independent research and development that are very, very fundamental. I say this primarily from having been on the industry side of it, but also from what I have seen in my present position If we are going to retain high technology, competitive viable industry in this country, then independent research and development is absolutely necessary to that,

and has to be paid for.

It has to be included in the price of the products and services, so including it in the price, it could be in profit, it could be in overhead, or

it could be in direct charges.

If it is in profit, of course it is paid entirely out of the funds of the corporations and is entirely under the management of the corporations. If it is in one of these other categories, there is a sharing between the contractors and the Government. I think if we were to develop a program which was entirely controlled by industry or was entirely controlled by Government, we would lose the advantage of the fact that all of the brains aren't either place. I think the system that we have now is actually a pretty good one, where there are prerogatives for industrial management and there are prerogatives for the Government.

The Government has the visibility as to what is going on. It has the control through the ability to disallow. The value received by the Government for the dollar is good because the costs are shared.

Now you asked about the reaction to the GAO report. I haven't had a chance to study the GAO report as carefully as I intend to, but I have scanned it, and I have reviewed a report of the testimony of Comptroller General Elmer Staats before the House committee that is looking into this. On the basis of what he said over there, I am reasonably in agreement with him, although I take issue with some of the things in the GAO report as I understand them.

The first thing the GAO report says is that it is very difficult to separate I.R. & D. and B. & P., and I could not agree more. I would even emphasize it and say it is virtually impossible in some cases, so

I think that point is a very well taken point.

The suggestions that they make that I.R. & D. be spelled out in the budget as a separate line item I think is completely impractical to administer. I don't really know what would be gained by that.

Senator McIntyre. Did you say GAO on line item?

Mr. Hansen. The GAO had suggested that the Congress consider having a line item in the budget for independent research and development and proposal and bidding as I understand it.

Senator McIntyre. May I ask Mr. Fine to comment on that.

Mr. Fine

Mr. Fine. What you are not aware of, which is very significant, is when the Comptroller General appeared before our subcommittee. he elaborated on that, and said that he was being misunderstood. The intent was not to establish a line item in the sense that would pull the dollars out of your various programs that would finance these and consolidate them, but rather in a broader sense of perhaps a ceiling of dollars, which would represent some measure of a total that should not be exceeded. So he has rather backed off to some extent on this interpretation.

Mr. Hansen. I see.

General Glasser. There is a comment I would like to make along this line. One of the values of the I.R. & D. program as it is currently conducted is this very freedom of operation that it has. We are moving in the direction of structuring it more and more. We are sending more of our technical people out to review the technical merit of this. We are generating more reports on it. There is another suggestion of introducing a line item in which we will finance the costs of the military people who are involved in conducting these reviews. We have a fear that what is going to happen is that there is going to be a lot of nonproductive overhead added to the I.R. & D. account, where all of the accountants and the lawyers and so forth gain great profit spending Government money but not doing research and development-independent or otherwise.

Mr. Hansen. I think that the I.R. & D. program that we have now is controlled about as much as anything. There are three separate and distinct controls on it. There is the internal control of the management people who want to make sure they are doing the right thing for their company. There are the controls from the Government through the review and audit to determine allowability of costs and cost sharing, and then there is the control of the free enterprise marketplace, where the person who elects to spend too much money in this area and makes

his overhead rates go up, loses out in a business way.

Senator McIntyre. Will you provide an estimate of the amount of funds that Air Force will pay in fiscal years 1969, 1970, and 1971 for I.R. & D., B. & P., and OTE?

Mr. Hansen. Yes, sir. I have those numbers in front of me right now.

Senator McIntyre. We don't want to hear them right now. Put them in the record.

Mr. Hansen. Very good. (The information follows:)

The total Air Force estimated costs for IR&D, B&P and OTE will be in the neighborhood of \$325 million for FY 1969, \$265 million for FY 1970, and \$250 million for FY 1971. As Secretary Seamans testified on 10 March 1970, it is quite difficult for us to estimate overhead costs for our contractors with any high degree of confidence. These figures are our best estimates at this time.

STRATEGIC TANKERS

Senator McIntyre. Our strategic tankers (KC-135s) today are up to 15 years old and by the time the B-1 is fully operational, they will be 25 years old. Does this mean that we will require new tankers for the B-1 or a modification of the KC-135?

General Glasser. The B-1 will be designed for use with the KC-135. However, your assumption is correct that we very well may require some modification to our tankers.

An alternative, of course, is to develop an advanced tanker, and we are this year requesting funds in the amount of \$500,000 to conduct studies of an advanced tanker for just this reason. This would not get into active development, however, until some later date.

ADVANCE TANKERS

Senator McIntyre. I was going to ask you if the modifications of the KC-135 could do the job for the B-1 how do you justify the \$500,000 for an engineering development program entitled advanced tanker? Your answer is that the KC-135 with modifications would probably do the job and in the meantime you want to play it safe and

be thinking of an advanced tanker.

General GLASSER. Yes, and because the current tankers cannot offload the fuel that is required for some of the tougher missions that you are going to face as we move out into the future and have to equip the current bomber force with more and more external stores, be they SRAM, SCAD, and so forth. A tanker with a greater off-load capability may be a better option considering the present bomber force as well as the B-1, so we want to study this alternative and determine if and when we can afford it in our force structure.

BUDGET AUTHORITY

Senator McIntyre. Your fiscal year 1970 program also indicates \$500,000 provided for the advanced tanker. Since this was not included in the budget submitted to Congress last year, what authority do you have to initiate this program in fiscal year 1970?

General Prits. A prior approval reprograming is now being processed through DOD which will request authority from the Congress

to initiate this program in fiscal year 1970.

General GLASSER. This is indicated in here to show the amounts of money that are planned for fiscal year 1970 so that the Congress will have that information, but it will have to come over for a prior approval reprograming before we can initiate it.

PRODUCTION INCREASE

Senator McIntyre. The December 31, 1969, selected acquisition report for the B-1 indicates that the original estimate of \$8,959.5 million for development and production has increased to \$9,377.1 million which is \$417.6 million higher. Since this program is just about getting started, why should there be such an increase?

General GLASSER. Chairman Stennis spoke to this question yesterday regarding SARS in general, and we certainly agree with the point that many times we find that from one SAR to the next SAR, or from 1 year to the next year there is an apparent increase in the

program.

We are attempting to establish the principle that the only figure that has real validity as a base line is that which is developed in con-

tract definition, and which is the program used as a basis for decision.

We believe those estimates that are generated out of in-house studies, supplemented by contractor data as they may be, are not valid. They are not relevant until they are nailed down after contract definition and a contractor's signature is at the bottom where the contractor in effect says "that is what I am committed to do and this is what it will cost you."

Now what has actually caused these changes in our estimates? They come from a variety of things, schedule changes, capability changes, but primarily they come from updating the costs in terms of 1970 dollars rather than 1968 dollars that were in the original planning

estimate used as the baseline in the SAR.

EFFECT OF INFLATION ON BUDGET ESTIMATE

Senator McInter. How confident are you in the total estimated development cost of \$2.230 billion stated in your descriptive summary, which is stated as being based on constant fiscal year 1970 dollars? Shouldn't you add an estimate for inflation to be more realistic and isn't your estimate for fiscal year 1971 understated?

General GLASSER. Our current estimate for RDT & E is approximately \$2.33 billion and this is based on the standard cost methodology that we have developed. Naturally since it states that it is in constant 1970 dollars, the estimate would go up for the same work if economic

escalation or inflation continues in future years.

Mr. Hansen. I would expect that there would be two things that would change our estimate in the near future. One is we are conducting source selection based on the proposals that we recently received, and this data should help us to refine our own estimates. The other factor is the one that you mentioned, that is, if we can get some agreement as to what factor for escalation should be used, that should help to refine the estimates. This program extends over quite a long period of time, and therefore the state of the economy is going to be a major factor in the cost.

General Glasser. In this connection I might comment that there is now a proposal to report in the SARS, for programs not yet under a fixed price type of contract, in what we call "then year" dollars. In

other words, include escalation as best as we can estimate it.

Once it is placed on some sort of a fixed price contract, the "then year" dollar estimate becomes academic, and it will be reported in fixed dollars. This is not an approved approach, but it is one that is being recommended at this time.

FIRST FLIGHT PROJECTION COST

Senator McIntyre. Is the \$100 million requested for fiscal year 1971

adequate to meet your projected first flight and IOC dates?

General Glasser. Yes, sir; with adjustments to the program. You understand that we were asking for \$196 million initially, and that was successively reduced to \$100 million. Of course the program has been successively adjusted to accommodate those changes.

B-1 TEST PLANE REUSE

Senator McIntyre. Your engineering development program for the B-1 will provide five test airplanes. Will any of these be refurbished upon completion of the test program and be used as an operational airplane?

General Glasser. Not in the case of the B-1 because there is no production program on the B-1 at this time. The disposition of those test

aircraft is a question remaining for the future.

You are aware I believe that the B-1 program does not include a production commitment at all. It is a development program only, in-

cluding those five test aircraft.

Mr. HANSEN. I think we should amplify the answer to your last question about IOC date and also note that we have no IOC date. We will only have a development program with a test program and the potential to meet an IOC date, should production be authorized.

Senator McIntyre. How much of the \$100 million provided in fiscal vear 1970 for the B-1 will be available to support your fiscal year 1971 program? Is this amount needed in addition to the \$100 million re-

quested for fiscal year 1971?

General Glasser. Yes, sir. The program has been planned in contemplation of a substantial carryover from the 1970 funds that have been approved because of the late initiation. We estimate that approximately \$80 million will probably be carried over.

SCAD PROGRAM REDUCTION

Senator McIntyre. What changes in your plans for fiscal year 1970 and fiscal year 1971 did the Congressional reduction of funds requested for SCAD from \$17.1 million to \$10 million entail?

General Glasser. May I have that question again, please, sir? I am

afraid I didn't understand it.

Senator McIntyre. What changes in your plans for fiscal year 1970 and fiscal year 1971 did the Cong. e-sional reduction of funds requested for SCAD from \$17.1 million to \$10 million entail?

What changes were forced by the congressional action.

Mr. Hansen. Only a delay in our planned timing to move ahead

with the program.

Senator McINTER. The SCAD program, as described, is planned to produce two different configurations, SCAD-A and SCAD-B and permit employment with the B-52 and B-1 as a pure decoy, and armed decoy, and an attack missile. Isn't this too optimistic an approach to take and wouldn't it be more conservative and less costly to concentrate on just one approach at a time?

General Glasser. That, in point of fact, is exactly what we are doing, sir. As we described to the subcommittee, our proposal is to come up with a vehicle which will fit in either of the airplanes, but which will then be tailored specifically for the individual airplane that it

goes with.

At this time it is our proposal to first ferret out the electronics, be certain that they work, get it into a flying vehicle for the B-52, and based on the success we have in that program adapt that flying vehicle with a new electronic package to the B-1.

When the B-1 comes in and the B-52s go out, we further contemplate that by modification we would salvage SCADS from the B-52 fleet to be incorporated into the B-1 fleet if all of this evolutionary program came off as contemplated.

Senator McIntyre. Will the \$33.6 million requested for fiscal year

1971 be used solely for SCAD-A?

General Glasser. Yes, sir.

TOTAL DEVELOPMENT COST

Senator McInter. What do you estimate the total development

cost to be for SCAD-A and separately for SCAD-B?

General Glasser. Excuse me sir if I may go back to that previous question, I forgot to mention that there will be a small amount of money for studies towards SCAD-B but it is a very minor portion of the money.

Now with regard to the total cost of SCAD-A and SCAD-B, that again comes back into the area of not being definitive at this time, because we haven't gone out to the contractors to get proposals to them. The best that I would be able to give at this time would be estimates

only.

I'm sorry I don't have them with me. I can figure out what the individual estimates are, and what the in-house planning studies are

for each of these and submit them if I may.

Mr. Hansen. The budget book estimates \$210 million as the development cost. It is my opinion that that number is low. My own personal estimate is that we would be a whole lot smarter to estimate a range, recognizing that we are not really far enough along to know. I would say that the \$210 million that the blue book says would be the bottom of my range. My guess is that the upper end of that range including inflation factors is maybe twice that.

General Glasser. If I may comment on the comment, as we described to you in the subcommittee hearing, these opinions are in large part founded on what you decide to put in as regards a guidance capability, what you decide to do as regards the amount of decoy that you put in, and how strenuous you feel about the range. These are factors that are not yet resolved, and on these some fairly substantial quantities of money swing.

If you want to make an attack missile, and as we described, it has a fallout benefit in the opinion of many of us; but if you want to make an attack missile with a good CEP you add \$100,000 per copy to the cost of the missile. If you want to give it an [deleted] capability that we discussed, [deleted] you add another \$100,000 to the capability.

We are not today asking you to make those decisions. We are saying we want to get started with the R. & D., to uncover those costs, to determine what the tradeoffs are and then, and only then, come in

with a hard estimate of what we think we should be going for.

Mr. Hansen. Let me amplify on the statement that I made. The approach I took to it was if it turned out that it cost twice what we now think it will, would that affect our judgment as to whether or not we should recommend that we go ahead with the program. I think the answer to that is no, this is one of the things which we need. We don't want to pay any more than we have to pay to get it, but it is

a capability that we do need. All we are really asking for at this time is money enough to move far enough along with the program so that we can generate what we think will be a qualified estimate as to what it will cost, both for the development effort and for the production costs beyond the development.

MINUTEMAN REBASING

Senator McIntyre. Turning to MINUTEMAN rebasing, there is a chance that there may be little duplication in these questions. Senator Murphy hit on this this morning for a while, but where there is

duplication don't be afraid to indicate so and just skip it.

Seventy-seven million dollars requested for a new program entitled MINUTEMAN Rebasing. Will you explain its objectives and its relationship to the Hard Rock Silo Program, the MINUTEMAN Integrated Command and Control System (MICCS), and the Advanced ICBM Technology program?

General GLASSER. Yes, sir. These latter programs that you describe are the elements from which two new program elements have been created, one called the MINUTEMAN Rebasing and the other one

called the Command Data Buffer.

The objectives within the MINUTEMAN rebasing item are threefold. One area of our work is looking at the command control features,

most of which came out of the old MICCS line item.

Another is looking at the hardening provisions, both the Hard Rock Silo and the further increased hardness, like the [deleted] psi silo, of the present thousand silos that we have. The third area is looking at new concepts, such as hard point defense and mobile features using garages, air cushion vehicles, things of this sort.

DUPLICATION

Senator McIntyre. One of the three programs to be pursued under the MINUTEMAN rebasing program is active defense for MIN-UTEMAN. The army advanced ballistic missiles defense program, for which they are requesting \$158 million in fiscal year 1971, has as one of its objectives the development of components of a MINUTE-MAN defense system to counter a possible greatly enlarged and more sophisticated threat than handled by SAFEGUARD. Isn't this duplication and isn't your program coordinated with theirs?

Mr. Hansen. Mr. Chairman, this is very closely coordinated I believe. I have sat in several meetings with the Army myself. It is

not a duplication.

The Army's program essentially [deleted], and we encourage, we support the Army in moving out to see what they could do in that way.

The Air Force's idea is different, and is compatible with that. The thing that we are interested in is that if it is possible to have a [deleted] then the approach to solve that problem might be different.

As the silos become harder, it takes a higher accuracy to hit them, but the higher accuracy also means that the threat tube becomes smaller. This permits you [deleted].

It is our belief that economies can be achieved in two ways. [Deleted] we believe that economies can be made. The funds that the

Air Force has are to look into the [deleted], whereas the Army is looking at it from the point of view of a [deleted] and we support their doing that. We feel that it is well coordinated. We feel that there is not and will not be any duplication.

DEPLOYMENT APPROVAL

Senator McIntyre. The identification of MINUTEMAN Rebasing as an operational development program implies approval by the Secretary of Defense for operational deployment. Will you explain?

Mr. Hansen. Would you repeat that question?

General Glasser. I can't explain it because I have asked the same question myself, sir. It is one of the things that is a consequence of the way D.D.R. & E. determine which component of the program a line item goes to. It could be moved without changing anything that we have said.

Senator McIntyre. Will you find out the answer, Mr. Secretary,

and furnish it for the record?

General GLASSER. It is a decision that was made by D.D.R. & E. and we can ask them that question and supply their answer for the record; yes, sir.

Senator McIntyre. All right, do that. Indicate the source.

General Glasser. Yes, sir. (The information follows:)

At the time the line item was established. DDR&E believed that it would be possible to select one mode of rebasing prior to the end of FY [deleted] and certainly prior to [deleted]. This estimate still appears correct for the later date, and it is intended that approval be obtained for operational development during FY [deleted] to permit the initiation of a development program. At present, there are a number of alternate basing modes being considered. These include Hard Rock Silo which has been in engineering development for a couple of years, shelter based Minuteman currently under study, a close in hard point defense overlay for the Minuteman silos (under study only), mobile basing concepts, and upgrading the hardness of existing silos.

DDR&E did not intend to imply that such an assignment constitutes either a

deployment decision or an operational system development decision.

OVERPRICING OF MOBILITY

Senator McINTRE. We have been advised that the plan for MIN-UTEMAN mobility, if pursued, will approach \$1 billion just for development, not to mention deployment. Doesn't this price this option out of consideration?

Mr. Hansen. I don't think you can come to the conclusion that it prices it out of consideration. It is obviously expensive, but whether it is more expensive than some other satisfactory options is something that we have to find out, and that's what our MINUTEMAN rebasing program is aimed toward. The thing that we really don't know until we study the various options more, is how effective will each one be and what will it cost.

The options vary from a probable minimum cost option of merely hardening the silos that we have to various options of mobility, additional hardening and point defense. Our intent is to learn enough about each of these so we can find out realistically what they might cost and what they might do, so that we can compare them to each other and make an intelligent selection against that data base to see whether or not what we get is worth what we would have to pay.

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General GLASSER. I think another way of looking at this is that the force in being represents a \$13-odd billion investment, and at this time while it represents the major element of the backbone of our national defense, anticipations of the threat show us that its capabilities erode with the passage of time.

We think that we must do something to preserve that defensive capability and at the same time exploit that very huge investment that has been made in the past. It is these options that we are looking at hoping to find the minimum cost and maximum effectiveness option

that we can employ for that purpose.

Mr. Hansen. I think it is hard to put a price tag on the value of a credible deterrent. Consider the amount of money that we are spending to protect the MINUTEMAN force with SAFEGUARD. Consider the amount of money that we have put into the force to begin with. We feel that we have to do what needs to be done to maintain a credible deterrent, and we want to find a way to do that which will accomplish the job for the least dollars.

ULMS PROGRAM AS ALTERNATIVE

Senator McIntyre. Would you care to comment on the Navy ULMS program as an alternative to large dollar expenditures for MINUTE-MAN hardening or mobility or active defense as envisioned under the MINUTEMAN Rebasing program?

Mr. Hansen. Yes. I would like to comment on that in a couple of ways. One as a strategic deterrent alternative for the United States, this is another thing we should know about to really know how much

it will cost and what it will give us.

I think that as an alternate for a landbased system we have to trade off what can be done there versus what it costs us to provide a useful capability by updating what we have already made a large investment for. We believe very much in the fact that we need the sea-based and land-based missile and manned aircraft alternatives so as to protect us against technological breakthroughs on the part of the enemy that might render one or two of those system ineffective.

This is a factor which has been much discussed over here I know, but at this stage of the game I would just summarize to say that the MINUTEMAN fleet is a system is being. We need to know what we can do with it for what cost. We also need to know what are the other viable alternatives and what do those really cost. We need to know more than just the back of envelope things. We have to do enough work so that we really have a good understanding of what their capability is and what their real costs are.

COMMAND DATA BUFFER

Senator McIntyre. All right, Mr. Secretary. Will you briefly explain the new program command data buffer for which you are asking

\$10 million in fiscal year 1971?

Mr. Hansen. Yes. This is a portion of what we previously called MINUTEMAN Integrated Command and Control System which was more grandiose. The Command Data Buffer we refer to as flexible retargeting. It is a capability to more quickly and more flexibly change the targeting in the MINUTEMAN fleet. In the present system that we have, there is what is called a Strategic Integrated Operational

Plan (SIOP) targeting revision which comes out every 6 months. It takes 3 months to do it, so this means that half the time the SIOP is in a state of revision [deleted] because we don't have the type capability that is represented by the Command Data Buffer.

This involves the provision of computers at the launch facilities and the ability to do reprograming locally in the area of the sites and

their launch control points, [deleted].

The new system permits retargeting of the force in response to known missile losses, failures or other situations. It permits rapid revisions and updating of the SIOP targeting [deleted].

PROGRAM COST

Senator McInter. What do you estimate will be the total development cost and total production and deployment costs if this program is successful? Are we committing ourselves to a very costly program?

Mr. Hansen. The cost, as in some of the other cases that we have discussed, is to further develop the alternatives as to how we might do it and determine how we can get done the essentials of what we have to do at minimum cost.

There is a proposal which is most costly, but also has the most

performance, [deleted].

There is another proposal which doesn't give quite as much capability, but only has some of this equipment in each launch control facility for subsequent transfer of [deleted] into each launch facility. I could provide for the record a range, depending on which operation that we select, as to an estimated cost to deploy this to the fleet. I would hope that we have with us here the data on the estimated development cost, approximately [deleted] million according to the descriptive summaries.

General GLASSER. The estimated cost of completion has not been computed out at this point because it is not identified as to just what will go into the program if it goes at all. I can give you one boundary on it, namely, the MICCS program that was replaced by this, which was reduced in the process, at a development cost of some \$136 million and a cost to install throughout the fleet of about \$473 million procurement. One of the principal reasons for the cancellation of that program was that people had the view that you have expressed, that it was costing too much money. So the present program is looking at a scaled down version of that, eliminating some of the features that were in that. At this time just what it will cost remains to be identified, but I can assure you that it will be substantially less than that, or it will be again canceled.

Senator McIntyre. I suggest we take a 5-minute break.

(Short recess.)

PREPARED QUESTIONS FROM SENATOR SMITH

Senator McIntyre. I have here some questions that Senator Margaret Chase Smith has sent down, saying she hoped to be able to get here today, but if not would I submit these for the record to you gentlemen, and if you will furnish the answers.

(Questions submitted by Senator Smith. Answers supplied by the Department of the Air Force.)

Question. Mr. Secretary, how have the in-house laboratories in the Air Force been affected by the reductions-in-force announced recently by the Defense Department?

What do you estimate the loss will be to the Air Force in the technological area?

Answer. There will be no further reduction-in-force in the laboratories as a result of the latest DOD reductions except for approximately 50 people at the Air Force Rocket Propulsion Laboratory, Edwards Air Force Base, California. The result will be a significant reduction of research and development effort on new rocket propellants and liquid rocket engine technology. The civilian manpower level of the Rocket Propulsion Laboratory has been reduced by 58 spaces.

Question. Mr. Secretary, on page 8 of your statement you make a shocking revelation with respect to a critically vulnerable part of our strategic missile force. You have stated that a missile can be rendered useless by a nuclear burst [deleted].

Just what are you doing in this field to maintain a strategic balance? Where in the research and development budget do you reflect this activity?

Answer. Today we overcome our fundamental limitations in missile guidance and electronics systems by [deleted], or other equally effective methods. These techniques, though highly effective, cost us a penalty in weight and/or complexity which we would like to eliminate in our follow-on strategic missile systems. The research effort to attain some fundamental improvement in our missile systems is spread among several disciplines and budget activities. The search for new ways of performing the guidance function is covered in the guidance and control tasks under Advanced ICBM technology (P.E. 63305F) and ABRES (P. E. 63311F); the analysis of current vulnerability and ways to counter the problems on current systems are covered in the MINUTEMAN program at SAMSO (P.E. 11213F); and, system electronics survivability analysis and testing are covered the Air Force System Survivability Program (P.E. 64711F). The Exploratory Development area, as well as various other Program Elements in the Air Force contribute significant pieces of research leading to the ultimate solution of our problems. Several of these contributing agencies are monitored and directed through the annual ABRES/laboratory coupling meetings.

Question. Mr. Secretary, from your statement I gather that, in your view, Section 203 of last year's act has had an adverse impact on your research and development program.

Would you be more specific and provide us some concrete examples?

Answer. Although Section 203 may have an adverse impact on our research and development program, we really won't be able to measure some of these effects for many years. For example, had the Army not supported the Wright Brothers, it may have been years until the Army appreciated the lack of an aviation capability. In fact, even after the worth of air power had been demonstrated, Billy Mitchell still had difficulties convincing some people.

My point is that the cost of not undertaking a research project cannot be

measured at the time the research is not supported.

I would point out, however, in the short time which has elapsed since we evaluated our program in the light of section 203 guidance, it has been necessary to cut back a portion of our work at the National Magnet Laboratory at the Massachusetts Institute of Technology. Dr. Benjamin Lax and his group have made significant contributions to our nation's knowledge regarding behavior of materials, specifically semi-conductors, under high magnetic fields. Some of this work was judged as not having a direct and apparent bearing on a military mission or function and so is being terminated. What phenomena or knowledge will remain undiscovered because of this Air Force withdrawal from the program cannot be foreseen. The alarming fact is that, although we have asked the National Science Foundation to assist in the support fo the Magnet Laboratory, the director has not been able to commit the Foundation for such support. We simply do not know who will support the work being eliminated from the Air Force program.

Similarly, although the Air Force is no longer going to support a research program in nuclear physics, we cannot tell whether undiscovered phenomena hold the promise of new sources of energy for propulsion or weapons. We will have to rely on the National Science Foundation or the Atomic Energy Com-

mission for this work.

Question. Mr. Secretary, have there been any resignations in the federal contract research centers (FOROs) as a result of Section 407 in last year's act? I am wondering whether, in your opinion, the Air Force has suffered because of that provision in the law?

Answer. One individual at Aerospace Corporation, with compensation in excess of \$45,000, has resigned since the enactment of Sec. 407, PL 91-121. While this may have not been the primary reason, it is believed that it may have been one of the contributing reasons for the individual's decision. The Air Force has not yet been noticeably affected in capability because of Sec. 407, but it is premature to determine the full impact of the law at this time since it has been in effect for only a period of three months.

Question. Mr. Secretary, I agree with you wholeheartedly that the Air Force must continue its relationships with the academic scientific community. I, too, am concerned about the dissident students and some faculty members who have disrupted our academic research programs.

What would you recommend be done to continue this vital research in our universities?

Answer. To date the Air Force basic research program has had very little disruption on the campus due to student and anti-Vietnam dissent. If the Air Force can continue to conduct basic research in the way we are doing it now, we will be able to continue our programs without undue problems. As many of the actions of the more militant left wing groups have been irrational, incidents may occur. However, we feel confident that such irresponsible dissent action will not receive large support from either faculty or students.

In basic research we strive to develop a relationship that is mutually advantageous to both parties. On one side, we have the Air Force interested in developing the necessary knowledge to insure the continued superiority of our aerospace forces. On the other hand, the universities and their faculty are interested in teaching, generating knowledge, and public service. These areas of interest overlap. The difficulties that have arisen where R&D facilities have come under sustained attack have been where the emphasis has been on the developmental (often classified) R&D activities. It is DOD policy that basic research contracts with universities be unclassified.

There should be no relation between university action on ROTC or civil disturbance and contracting for defense projects. DOD does not want to lose research expertise because of unrelated actions in other sectors of the university.

Question. Mr. Secretary, I firmly believe that even if an agreement is reached with the Soviets on arms limitations, we must continue a viable research program.

Do you agree with me that to do otherwise could well result in a drastic change in the balance of power?

Isn't this particularly so if the treaty were abrogated?

Answer. Senator, I agree. A viable and imaginative research program conducted by and under the sponsorship of the DOD forms the basis for our capability to provide for the defense of the United States.

The SALT talks may result in a limitation of arms of certain classes, capabilities, or basing concepts. However, history has shown that continued research and development leads to new and previously unimagined concepts and capabilities in both offensive and defensive systems. To insure that a drastic change in the balance of power does not occur, and to make sure we maintain the capability to counter the threats which will surely develop from other nations' advances in technology we must have an active and productive research and development program.

Question. Mr. Secretary, everyone assures us that concurrency in development and procurement of weapons is being climinated.

Air Force Testimony reveals that you plun to begin producing SRAM on June 1, 1970. The bulk of the RDT&E effort will not be completed until mid year 1971. Will you comment on this inconsistency?

Answer. There really is no inconsistency in the SRAM procurement plan as currently proposed. The development program when considered on a total weapon system basis will have accomplished over three-fourths of all the test requirements prior to commitment of any production funding. The motor qualification testing will be about seventy percent complete and the only remaining item will be completion of the flight test program by mid year 1971. The flight testing demonstrations to date have satisfactorily shown that the previous development difficulties have been resolved. The remaining flight tests will provide additional statistical information to verify the current position. There are several other parameters that must be considered in transitioning between development and production such as the threat and production continuity. The threat clearly indi-

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cates that the bomber force requires SRAM in order to penetrate the terminal defenses in the early 1970 time period. The second important factor is the ability to retain the core of the limited development SRAM production capability; thus, not having to requalify the various suppliers.

Question. General Glasser, you have been quoted in a recent publication referring to your present assignment as, "Deputy Chief of Staff, Requirements and Development," rather than recarch and development.

If the title were changed, do you believe it would have a salutary effect on the public attitude! I agree with you that research is the vehicle to fulfill require-

ments.

Answer. Most certainly I see an important facet of my current position in the research and development community to be identifying and satisfying requirements. This is further underscored in that one of my Directorates in the Deputy Chief of Staff for Research and Development has the title Air Force Directorate of Operational Requirements and Development Plans; however, I doubt that a simple changing of my office title would provide the needed boost in public confidence I referred to in the recent article. More importantly, I was trying to bring attention to this critical element in the weapons acquisition process. In this vein I would like to take the opportunity to further expand on my thoughts regarding the job we do in requirements as related to our public image.

The necessity to show relevancy of our RDT&E dollars to military requirements was highlighted in the FY 1970 Authorization Bill where Section 203 stated, "None of the funds authorized to be appropriated by this Act may be used to carry out any research project or study unless such project or study has a direct and apparent relationship to a specific military function of oper-

tion."

From every functional area in the Air Force "needs" are identified which result from an existing or foreseeable deficiency in our operational capabilities. Funding requirements for projects proposed to satisfy these needs far exceed current projections of Air Force RDT&E funds. Our job in weapons development and acquisition is to determine which of these needs, if satisfied through our RDT&E program, offers the greatest potential for increased operational capability. The process of determining these most critical needs we call the "requirements process."

A key element in the requirements process is our development planning effort. In this task we are concerned with identifying a full range of programs throughout all phases of research and development which can be accomplished within projected fiscal constraints. Our goals must be a base of technology relevant to future system capabilities as well as the acquisition of those capabilities which

contribute most to an effective and credible National Defense Program.

In this sense, how well we do our job in identifying requirements, in planning for the development to acquire new capabilities, and in managing the RDT&E programs to satisfy those requirements not only affects our operational capability, but also helps to meet that equally big order of improving public confidence. These are equally big tasks in the current environment of financial cutbacks and changing public attitudes; however, in both we are really going to try.

Question. General Glasser, the word "adequate" frequently is employed in describing the level of research and development. It also is coupled with the need to maintain technological leadership relative to national security. Yet, we continue to see such requirements as behavioral and social science whose relevancy to national security has been questioned.

Would you care to comment on this?

Answer. The Air Force is concentrating its behavioral sciences research on areas related to improving human performance and more effective utilization of its human resources, the men on whom the hardware depends. These efforts are directed toward better selection and classification techniques, greater knowledge of man's capacities and limitations as they apply to equipment design and operation, more innovative and effective training, and means of motivating and retaining qualified personnel. All of these areas become increasingly important in anticipation of an all-volunteer force.

The area which has been particularly subject to criticism for apparent lack of relevance to the military mission—the social sciences—has been almost completely phased out of the research program and efforts made to get other agencies

to help meet these needs of the Air Force.

Question. General Glasser, we have found that some estimates of individual major weapon development and production costs have been based on FY 1969 dollars while others reflect FY 1970 dollars, FY 1971 dollars, or provide for infation in subsequent years. If this is typical of your budget, aren't you substantially underestimating your requirements?

Answer. Bureau of the Budget guidance for developing the Air Force Budget Request has been, "it will be assumed that on the average the general level of prices will be the same during the budget year as at the time the estimates are prepared."

As a general rule, the FY 1971 Budget reflects 1970 dollars for the budget and out-year estimates consistent with BOB guidance. It must be recognized that, although it cannot be separately identified, there could be some economic escalation included in the instances where estimates are based on contractor data. As long as the current inflationary trend continues to be a significant factor in "cost growth", resultant changes to cost estimates from year-to-year should be expected.

Question. General Glasser, why isn't the problem of increasing our technology base, insofar as it is important to the defense program, one of being more selective in the areas of technology and specific tasks we pursue, and specific scientific and engineering personnel whom we employ or support in these pursuits?

Answer. Selectively is a relative matter. We have always tried to make our technology base efforts selective, limited to the areas of research and development which have potential impact on future Air Force operational capabilities. Likewise, we have been selective in choosing the people to conduct those efforts, both in our own laboratories and on contracts and grants. But in recent years, we have exercised greater selectivity. As an example, in our exploratory development program, which is our applied research area, we have gradually shifted the primary emphasis during the 1963-68 period from space related effort to effort aimed at aeronautical systems in response to the changing emphasis in the Air Force's mission. We also reduced our biological and chemical warfare effort in favor of other nonnuclear munitions even before the President's recent order regarding that area. In the research program, which is our basic research effort, the availability of funds relative to fruitful research opportunities has always limited our sponsorship of promising research to a fraction of the potential effort. This has not only permitted, but forced, a high degree of selectivity in that program, A partial exception was the Themis program in which the selection was limited to universities which were not already receiving large amounts of Defense R. & D. funds. But even in that program, only a small fraction of the proposals submitted could be supported. Therefore selectivity was retained. Our selectivity has been further narrowed as the result of section 203, Public Law 91-121, inasmuch as it has resulted in reduction or elimination of effort in some areas in which, although there is surely potential payoff, the individual efforts concerned are not clearly relatable to "a specific military function or operation." Examples of these areas are nuclear physics, basic chemistry, and mathematical sciences. Inasmuch as many advances in the past have resulted from "unrelated" research, there is no way to know the impact of this narrowing of field. At this point, we do not see increased selectivity as a means to expand the technology base, but rather as a narrowing of the technology base forced by reduced funds.

Question. General Glasser, you have \$77 million in this budget for hardening MINUTEMAN and mobile rebasing. The Army is seeking almost \$1 billion for research and development and procurement of SAFEGUARD this year to be added to last year's \$352.4 million, which was appropriated. Huge amounts have also been spent on missile defense in countless programs.

These are all missile defense systems.

Has anyone conducted studies to determine the relative cost of merely increasing the MINUTEMAN and POLARIS forces by utilizing the funds being spent to defend MINUTEMAN?

I would be interested to know what the offensive missile force would be if this were done.

Answer. The Air Force has made evaluations of increasing the number of MINUTEMAN missiles to counter the increasing Soviet strategic threat. This approach is cost effective only when the added missiles are deployed in basing modes with increased survivability. The main objective of the MINUTEMAN rebasing program is to evaluate means of enhancing prelaunch survivability of the programmed MINUTEMAN force. Several basing modes are being considered as well as hard point defense concepts. Whatever mode is selected would be suitable for deployment of additional MINUTEMAN missiles.

POLARIS is subject to a different threat than is MINUTEMAN. For that reason no really meaningful comparison can be made in terms of increased overall capability between deploying additional POLARIS/POSEIDON missiles and improving the survivability of the MINUTEMAN force. Rather, the fact that these two systems are subject to different threats forms the basis for having a mixed strategic offensive force.

The structure of the offensive missile force that would result from a decision to deploy additional missiles would depend on many factors such as the missile configuration to be deployed, the basing mode selected, the time that the deployment was initiated and the deployment rate. For rough comparison purposes about [deleted] MINUTEMAN III missiles could be procured and deployed for each \$1 billion invested.

F-15 CONTRACT STATUS

Senator McIntere. If it is agreeable with you gentlemen we will go just a few minutes longer, and then I will ask you to be back here

at 2:30 tomorrow afternoon to finish up.

Is the \$370 million requested for development of the F-15 aircraft consistent with the requirement of the airframe contract which was awarded to McDonnell-Douglas in December 1969, and with the engine development contract awarded to Pratt & Whitney in late February 1970?

General GLASSER. For fiscal year 1971 the answer is yes, sir. The contracts were let on the basis that those would be the funds that

would be available in fiscal year 1971.

BOMBER PENETRATION PROGRAM INCREASE

Senator McIntyre. With the approval to proceed with the B-1, which will employ the SRAM and SCAD, why aren't these programs sufficient to pursue the objectives of bomber penetration? Why is it necessary to increase your separate strategic bomber penetration program from \$2.1 million to [deleted] million in fiscal year 1971?

General Glasser. The bomber penetration line includes the on-board systems other than these missiles that you refer to. These systems include the penetration aids that may be required in the future.

Senator McIntyre. The bomber penetration program that you have here, strategic bomber penetration program does not have ref-

erence to onboard?

General GLASSER. It does have reference to "onboard," but it does not include things like SCAD and SRAM. Rather it is the other items that have not yet been singled out as individual programs like we have singled out for SCAD, SRAM and so forth. This is for follow-on penetration aids like [deleted.]

Senator McIntyre. I think it would be helpful if you indicate what

is in that strategic bomber penetration program.

General Glasser. Yes, sir.

Senator McIntyre. For the record.

General GLASSER. Yes, all right, sir, I will submit that for the record. (The information follows:)

The strategic bomber penetration program is a source for studies and analysis, hardware advanced development, and technology demonstration of solutions pertaining to strategic bomber penetration problems. Based on the postulated threat, our current and future bombers will be able to accomplish a major portion of the Assured Destruction task if we deploy SCAD to dilute area defenses and SRAM to suppress terminal defenses. However, new or improved penetration aids may be needed to cope with the ever changing and elusive threat. Thus we continually

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conduct analyses of the operational interactions between evolving threats and various penetration aid ideas. We also plan to initiate advanced development of equipment that appears promising and to demonstrate the technology needed before starting engineering development of an advanced penetration aid. This program will cover all new bomber penetration aids concepts and related advanced developments other than the electronic warfare system efforts carried out under Penetration Aids—Manned Aircraft (PE 63718F). It is intended to serve the same function for strategic bombers as the advanced ballistic reentry system (Abres) program is for strategic missile penetration aids.

The penetration aid candidates currently under consideration are an [deleted]. It is important to note that these are potential requirements that have not yet

been validated by the Air Staff.

[Deleted.]

Senator McIntyre. Will you provide a list of all the programs and amounts for fiscal year 1970 and fiscal year 1971 which contribute to your operation of the Arnold Engineering Development Center?

General Glasser. Yes, sir.

(The information follows:)

The following programs will contribute to the operation of Arnold Engineering Development Center in fiscal year 1970 and fiscal year 1971. The amounts are estimates.

Fiscal year 1970

Programs	In thousa
Air Force:	of dol
MINUTEMAN	2.
SRAM-AGM 69A	
F-4E	
F-111	4 ,
FB-111	
F-15	
A-7	
C-5A	3.
NIKE Targets	
Special support activities	
RF-4C	
Advanced sensor technology	
Aircraft propulsion system integration	3.
Advanced ballistic reentry system	 4.
Advanced space guidance	
Spacecraft and advanced reentry technology	
Environment	
Materials	
Aerospace flight dynamics	
Rocket propulsion	
Aerospace propulsion	1.
Aerospace avionics	
Conventional munitions	2.
Clear sky	
Scientific and technical intelligence	
Armament/ordnance development	
Improved aircraft gun system	
International cooperative R. and D.	
AIMS	
Defender	
Conventional weapons	
Space studies	
. Research for other Air Force agencies	1.
AEDC testing technology	7.
Army	
Navy	
NASA	
FAA	
Private firms	
Miscellaneous revenues	
bijechaneous levendes	

Fiscal ucar 1971

Air	Force: In Programs	thousands of dollars
	MINUTEMAN	
	Compass Arrow	
	TITAN III	
	('-5A	-,
	F-111	
	Materials	
	Aerospace flight dynamics	
	Rocket propulsion	
	Aerospace propulsion	
	Aerospace avionics	
	Conventional munitions	2,000
	Aircraft propulsion systems integration	
	Advanced ICBM technology	
	SRM	
	SCAD	. 833
	Advanced ballistic reentry systems	
	Advanced space guidance	. 57
	Spacecraft advanced reentry technology	
	Advanced sensor technology	
	Advanced aerial targets	
	F-15	
	AX	
	B-1	
	Armament/ordnance development	
	Improved aircraft gun systems	_ 120
	FB-111	_ 942
	International cooperative R. & D	. 100
	Research for other Air Force agencies	1.000
	AEDC testing technology	7,600
Arn	ıv:	
	SAFEGUARD	. 832
	Army missile command	_ 63
Nav	y: Strategic systems	
	SA:	,
	Space shuttle	1, 400
	Viking	
FA	A: Supersonic Transport	
	-	
	Total	62, 513

AWACS DEVELOPMENT COSTS

Senator McIntyre. What do you estimate will be the total development cost of AWACS, for which you are asking \$87 million in fiscal year 1971?

General GLASSER. I'll have to look that up and give you an exact figure, sir. The planned R.D.T. & E. requirements, including prior years spread out through fiscal year 1976 will be \$681 million of R.D.T. & E. funds.

Senator McIntyre. How much?

General Glasser, \$681 million.

Senator McIntyre. How many AWACS aircraft do you estimate will be required to perform the continental United States air defense mission, and overseas tactical mission? What unit and total costs will this entail?

General Glasser. We are presently planning a [deleted] aircraft program to cover both the continental United States and the tactical air forces, and the total program cost associated with those is \$1.183

billion of production funding, excluding initial spares, so when I add that to the R.D.T. & E. associated spares and so forth, we come to a total cumulative program cost of \$2,064,000,000.

Senator McIntyre. \$2,064,000,000 ?

General Glasser. Yes, sir.

Senator McIntyre. Your descriptive summary states that you will initiate contract definition for the CONUS Over The Horizon Radar in fiscal year 1970 with two or more contractors. Have the contractors been selected?

General GLASSER. Not yet, sir.

Senator McIntyre. And will the \$2.850 million for fiscal year 1970 and \$5.3 million in fiscal year 1971 be sufficient to complete contract definition?

General Glasser. That is our plan, sir.

Senator McIntyre. That is your hope, your plan?

General Glasser. Yes, sir.

RESPONSIBILITY FOR AIRCOM PROGRAM

Senator McIntyre. You are requesting \$3.5 million in fiscal year 1971 for AIRCOM, compared with \$1.2 million in fiscal year 1970. Doesn't this program, which supports the defense communications system properly belong under the defense communications agency?

General GLASSER. That has been a discussion each year. This has generally been accepted as those items that must be done within and by Air Force agencies and Air Force supported agencies to supplement the work done by DCA.

AIR TRAFFIC CONTROL INCREASE

Senator McInter. The Congress approved a program of \$1.5 million in fiscal year 1970 for traffic control, approach and landing system (TRACALS). This is now reflected as \$11.7 million in the fiscal year 1970 column of the fiscal year 1971 budget. Will you explain this and why an additional \$5.5 million is requested for fiscal year 1971?

General Glasser. I apologize. I missed the item you referred to.

Senator McInter. Congress approved a program of \$1.5 million in fiscal year 1970 for traffic control, approach and landing system (TRACALS). This is now reflected as \$11.7 million in the fiscal year 1970 column of the fiscal year 1971 budget. Will you explain this and why an additional \$5.5 million is requested for fiscal year 1971?

General GLASSER. Yes, sir; I don't have that answer at my fingertips,

sir. I will have to look it up if I may and supply it for the record.

(The information follows:)

This change provides the funds required in FY 70 to continue development of the two prototype models of the Air Traffic Control Radar (AN/TPN-19) and the transfer of \$1,500,000 Tactical Air Control and Landing Devices Technology Program into the TRACALS Program (reference Reprogramming Action DOD No. 70-3). The radar program was initiated in the latter half of FY 69 and reported to Congress in Reprogramming Action DOD No. 69-87. The remaining \$8.7M represents the partial restoration of funds reprogrammed in FY 69 because of delays in initiating the program.

The \$5.5M requested in FY 71 are required to continue the TPN-19 Program

and other TRACALS efforts as follows:



In thousands

of de	ollar s
AN/TPN-19 (Landing Control Central)	2,600
Master planning and mission analysis	300
NAVAIDS (TACAN avionics)	1, 350
NAVAIDS (TACAN ground)	550
Advanced landing system	200
Tactical radar (clutter suppression)	100
System support (test activities)	400
Total	5, 500

Senator McIntyre. This is the last question of the evening which goes with that one. Why shouldn't that program be terminated, since the Federal Aviation Agency has primary responsibility for this function.

General Glasser. This is because these are not the items that are used in the continental United States where the FAA has the problem. These are lightweight transportable landing control systems for use in all weather environments to support worldwide operations. These are things that the Air Force must take with it. They are the overseas or the contingency operation traffic control approach and landing systems.

PREPARED QUESTIONS FROM SENATOR THURMOND

(Questions submitted by Senator Thurmond. The answers supplied by the Department of the Air Force.)

Question. In September quarterly reports the Air Force reported that the estimated R&D fund requirement for the SRAM missile would be for \$35 million for FY 1971. Now the Air Force is asking for \$46 million for FY 1971 funding. What's the additional funding requirement fort Is this indicative of added R&D problems with this program? The report indicates that the added costs are for overtarget cost.

Does this also mean that the costs are going up higher?

Answer. The increase from \$35M to \$46M for FY 1971 funding is based on the best estimate of the final negotiated contract effort with the prime contractor, Boeing. It assumes that the government will experience a total program funding requirement to full contract ceiling which would be equivalent to a \$72 million overtarget cost to the government. The total program cost has gone up by \$12 million (ie, \$11M FY 1971, \$1M in FY 1972) as described above.

Question. The December quarterly report indicates that about \$5.15 million will be required for B-52 modifications and spares for the SRAM missile program. The report indicates that the missile program unit cost now is about [deleted] thousand per unit now. If this modification cost is added the cost of this program is significant.

Since the estimated cost has risen sharply on this program, have any recent evaluations been made, such as the management concepts that we have been hearing about, to determine if this system is still a required cost effective system to use?

Answer. Yes; the management concepts previously discussed have been employed on this program during the past year. You may recall that the entire SRAM production program was deferred on April 1, 1969, because of the development difficulties that had been encountered on the program. As a result of this deferral the entire production program was reevaluated and restructured to allow for the maximum amount of development testing to be completed prior to any production commitments without losing our limited industrial production capability base. The other important parameter in this evaluation is the threat which clearly requires our bomber force to have a SRAM capability in order to perform its operationally assigned mission. In any event production will not be initiated without a thorough reevaluation of costs, effectiveness, and the threat to be certain that this is still a sound decision.

Question, B-1. Is the supersonic capability being considered for the B-1 a necessary capability to perform its mission?

What is the cost tradeoff to obtain this supersonic capability and is it worth the money from an operational standpoint?

Answer. Senator, we believe that the high-altitude supersonic speed capability of the B-1 is essential. Because of the uncertainties involved in the future threat, bomber tasks and pen aid effectiveness, a follow-on bomber should have the speed and altitude versatility to provide a broad range of operational tactics. The use of supersonic speed could decrease bomber exposure time and complicate the defense problem. Supersonic speed is a desirable and effective penetration option for perimeter [d__ted] defenses and could provide the basis for [deleted].

Against the uncertainty of the future threat, we cannot anticipate what the best way to penetrate is going to be at that time. Therefore, we want to build into the aircraft the flexibility to be able to penetrate high in circumstances where that's the best way to penetrate, and supersonic if high is the best way, or to be able to penetrate subsonically in circumstances where that's the best way to penetrate. In the final analysis, the advantage of supersonic speed is largely a matter of judgment. No amount of analysis is going to provide complete confidence that in a conflict, one mode of penetration will always be preferred.

Our best estimates indicate that the supersonic speed costs are approximately 20 to 30 percent greater (10-year system costs) than a comparable all-subsonic design. It is our judgment that the operational flexibility inherent with a supersonic speed capability more than offsets the additional costs.

COMMITTEE RECESS

Senator McIntyre. We will recess until 2:30 tomorrow afternoon. We will recess until that time. I don't believe we will take much more than an hour or so but in view of the fact that I will have to go to the floor pretty soon, thank you very much.

We will see you tomorrow.

(Whereupon, at 5 p.m., Thursday, March 12, the committee was recessed, to reconvene at 2:30 p.m., Friday, March 13.)

MILITARY PROCUREMENT FOR FISCAL YEAR 1971

FRIDAY, MARCH 13, 1970

United States Senate, Committee on Armed Services, Washington, D.C.

The Committee on Armed Services met at 2:35 p.m., in room 212, Old Senate Office Building, Hon. Thomas J. McIntyre presiding.

Present: Senator McIntyre.

Of the staff of the Committee on Armed Services: Labre R. Garcia, professional staff member.

Of the staff of the Preparedness Investigating Subcommittee: Hy-

man Fine.

DEPARTMENT OF THE AIR FORCE

RESEARCH AND DEVELOPMENT

STATEMENT OF HON. GRANT L. HANSEN, ASSISTANT SECRETARY OF THE AIR FORCE (RESEARCH AND DEVELOPMENT), AND LT. GEN. OTTO J. GLASSER, DEPUTY CHIEF OF STAFF, RESEARCH AND DEVELOPMENT

CIVIL ENGINEER TECHNOLOGY PROGRAM

Senator McIntyre. The committee will come to order. General, why couldn't your Civil Engineer Technology Program for which you are requesting \$2 million be treated as a level of effort program and be maintained at the \$1 million level provided in fiscal year 1970? Isn't the fact that the Congress reduced the \$2.5 million requested last year to \$1 million a clear indication of intent?

General GLASSER. It is difficult for me to determine intent in that. I would have to interpret that as a lack of success on our part to demonstrate to the Congress that we need or needed in 1970 the money

we had asked for.

This is an area of effort that is relatively new in the Air Force program. It was generated in only recent years to meet a very crying need in our opinion and we have been gradually attempting to build up expertise and to find the funding for this.

I regret that we were unable to convince the Congress last year that we needed what we asked for, but I think we do need funds of that level of effort and we hope that we can so demonstrate.

(1195)

RESPONSIBILITY FOR DESIGN CRITERIA

Senator McInter. You are proposing a new \$500,000 program of "Design criteria for technical facilities," which previously was supported under "Preliminary design development planning." Why isn't this more appropriate to the Military Construction Appropriation Authorization?

Mr. Hansen. If I might answer that, Mr. Chairman, this is an example of what I spoke of yesterday. In my opinion the item that you just talked about plus this item and one other item I think really should be in a package because they are related things, and under a single program element, and I will attempt to do that next year.

Now, to specifically discuss this one, the reason it is different and the reason that it is broken out is this is the establishment of the design criteria for large highly specialized, highly technical test or engineering facilities such as the High Reynolds Number Tunnel for AEDC, the hypersonic true temperature wind tunnel, the advanced engine research facility at Wright-Patterson Air Force Base, and the munitions test range at Eglin.

These are some examples of the type of very complex, very highly specialized facilities for which design criteria have to be drawn in order to determine feasibility, to get an estimate, in order to introduce that item into the channels by which those facilities might eventually

be authorized.

Now, as an additional example, part of the money on that particular program element of design criteria development is for a group of items, techniques for handling and disposal of toxic and explosive chemicals and rocket propellants for Edwards Air Force Base, which is considered to be a facility type of thing but which will be very highly specialized and therefore different than the sort of thing which is a normal construction type operation that involves buildings and roads and security fences and standard facility type things.

PURPOSE OF ITCS BUDGET REQUEST

Senator McInter. Last year the Congress reduced Project Mallard, the International Tactical Communications System in the Army budget, by \$5 million, from \$21 million to \$16 million, because (a) historically joint international development programs are inherently turbulent and trouble-ridden, and (b) it was considered inconceivable that the Department of Defense would embark on an international development program of this nature and magnitude (total program cost of \$1 billion estimated) when a militarywide tactical communications system has never been developed for the military services of the United States.

In the conferees' report on the fiscal year 1970 appropriation bill, the Department of Defense was "Strongly urged to explore as soon as practically possible the discontinuance of this international development effort through the mutual consent of the participating countries."

We have asked the Army, in view of the above, why they require \$14 million in fiscal 1971 and how they had reacted to the explicit recommendation in the conference report on the appropriation. Why is the Air Force asking for \$1.7 million in fiscal 1971?

Mr. Hansen. As you mentioned, the Army is the DOD executive agent for the Mallard project. The \$1.7 million funds which the Air Force requested are for the Air Force portion of the total program which would be accomplished in fiscal 1971. It presumes that if the total program moves ahead in response to the Army's request and justification, that the Air Force will continue active participation.

If the total program is not approved, then the Air Force portion is not required and we would continue with the present system. The Air Force portion of this program is participation in the tactical trunk and switching portion of this communication system which is,

however, a significant part of the whole program.

I would feel that the principal questions relative to the Mallard program should be addressed to the Army as the executive agent for the program. The Air Force portion is merely in support of that portion of the system which we anticipate the Air Force would use.

WEATHER RECONNAISSANCE SENSORS

Senator McIntyre. Well, we will await the Army's answer.

You are proposing a new program "Sensors for weather reconnaissance aircraft" for \$1 million in fiscal 1971. However, the total development cost is estimated as \$7.9 million.

Since the Air Force shares the national responsibility for hurricane reconnaissance, which this program supports, why doesn't the Air Force contribute only half the funds for this subsystem?

Mr. Hansen. May I ask that the question be repeated, Mr. Chair-

man? I lost the track somewhere in there.

Senator McIntyre. I will repeat it. Since the Air Force shares the national responsibility along with the Weather Bureau for hurricane reconnaissance, which I understand this program supports, why doesn't the Air Force contribute only half the funds for this subsystem?

You know, share it with the Weather Bureau.

Mr. Hansen. Well, the total hurricane reconnaissance and warning program has other parts to it than this. The Air Force flies some reconnaissance flights. The Navy flies some reconnaissance flights. The Weather Service has a number of operations of their own, all of which contribute to the total program.

In response to a request after Hurricane Camille to see what more the country can do, the Air Force offered this improvement in its capability as a contribution to the overall improvement of the system.

Now, I would certainly be willing to go to the weather people and ask them if they would fund half of this but I suspect that their answer might be that they have other things that are related to this for which they have planned and would require their funds and they feel that the Air Force should make good on the part of the program that we have suggested that we could contribute.

UTILIZATION COST

Senator McIntyre. Once developed, how much do you estimate will be needed to procure and install the operational equipment?

Excuse me, I have to go on the Senate floor and answer that call.

(A short recess was taken.)

Senator McIntyre. Let me repeat. We are talking about the new program, sensors for weather reconnaissance aircraft, for \$1 million in fiscal 1971, with a projected total development cost of \$7.9 million. Once developed how much do you estimate will be needed to procure

and install the operational equipment?

Mr. Hansen. Mr. Chairman, we have not determined that amount vet. We have not started this job at all and therefore we have no basis as yet on which to make that estimate. Our plan is a phased plan in which we would start with the definition of the job and establish decision points which we would decide based on the cost and the capability, whether we should proceed further with it or drop the project.

COMMON MOBILITY SUPPORT EQUIPMENT PROGRAM STATUS

Senator McIntyre. Common mobility support equipment is proposed as a new program for \$4 million. The statement is made that prior year efforts were accomplished under the "Other equipment development program." Since you also state that you anticipate the program will diminish in size and scope in future years, why should this be established as a separate new program?

General Glasser. This is a program which was previously in the operational support areas and which has been brought out merely to put emphasis on it. It has been a project called Bare Base Support in the past and it has been brought out for identification purposes

and for wrapping up.

Senator McIntyre. What do you mean wrapping up?

General Glasser. To establish the project as a single item of its own that is clearly identifiable as the Bare Base item rather than being an element of the much larger conglomerate line item that it was included in before.

Mr. Hansen. I might add, Mr. Chairman, that this item is specifically to take care of shortcomings and problems that were found during the Bare Base Exercise which has to be remedied. As they went through that exercise they found out that certain things had not adequately been provided for such as waste disposal, for example, and that more work has to be done for those items. That comes in this program

In my opinion this program element could very well be combined with one on technical facility criteria and the one on civil engineering because as I see it, it is all sort of related things that have to do with the R. & D. work for facilities.

TACTICAL ELECTRONIC OPERATIONAL SUPPORT SYSTEM PROGRAM MODIFICATION

Senator McIntyre. Under Tactical Electronic Operational Support System you are asking for \$2 million in fiscal year 1971 to conduct contract definition for [deleted]. The total development cost is estimated to be [deleted] million.

Isn't this just the beginning of a modification program that will

run into hundreds of millions of dollars?

General GLASSER. Well, it is the beginning of a modification program. The exact amount that it will run to is not known at this time. Certainly it won't be insignificant, but the requirement is a very real one

and an important one.

The efforts that have been accomplished in Southeast Asia, using [deleted] to date, have been of very, very considerable value and I think that it is necessary that we modernize. Of course, as we progress with the development program we will have the opportunity to make a better assessment of what these procurement costs will be, and to determine whether it is worthwhile, but as of this time it certainly seems to us that it should be done.

Senator McIntyre. Regarding this same requirement, you state that although the [deleted] are very effective in Southeast Asia, they lack [deleted]. What vital need is there for this capability and what capability does the Army or Navy have?

General Glasser. So far as the need is concerned, it is a matter of

being able to carry sufficient equipment to cover the [deleted].

Senator McIntre. And what capability does the Army and Navy

have now?

General GLASSER. There are complementary items within both the Army and Navy. I don't have the details of them with me today. I could supplement the record with a runout of those.

Senator McIntyre. All right. Do that, please.

(The information follows:)

The Army has [deleted] capability. The direction finding equipment used operates between [deleted]. In addition, the RU-21Ds can also locate enemy radios operating between 20 to 100 MHz. All of the [deleted.] The Navy has no equivalent operational capability.

Senator McIntyre. A report from the Comptroller General dated February 4, 1970, commented on illegal expenditures of funds for construction of research facilities by the Air Force. These facilities are the Celestial Guidance Laboratory and Laser Research Facility acquired by the Avionics Laboratory, Wright-Patterson Air Force Base, Ohio.

GAO considers that this construction using R.D.T. & E. funds was not within Air Force statutory authority and GAO has recommended that the Secretary of Defense take corrective action, but the Air Force disagrees with the GAO conclusions.

Will you explain?

Mr. Hansen. This is a matter of interpretation of what the words that both the Air Force and the GAO read really mean. The Air Force now accepts the interpretation of those words which have been given by the GAO in their report, and we have taken action to assure that nothing is done in the way of spending any of the R. & D. money for construction-type work which does not fall within the interpretation of the law as now given to us by the GAO.

In other words, they say they think we did wrong. We say we didn't intend to do wrong. We thought that what we were doing was within our purview. However, we accept the GAO's interpretation and have taken steps within the Air Force to see to it that the

GAO's interpretation prevails from here on.

BASE DEACTIVATION

Senator McIntyre. As the DOD workload at the Eastern Test Range declines, will the need for Patrick Air Force Base to support those operations decrease to the point where it may be deactivated and other air bases in the area used instead?

General Glasser. That is possibly so, sir. I referred yesterday when we were speaking about the Western Test Range to the declining workload and the declining support that we have been giving to the Eastern Test Range. And as this ETR workload goes down, it certainly brings into question the requirement for Patrick Air Force Base which is, after all, the primary support facility for the Eastern Test Range.

A number of things may transpire, and these are being looked at right at this time. Patrick Air Force Base has a great many very excellent modern facilities that have been put there at considerable expense in recent years. In that regard it is a much better base, housingwise, technical facility-wise, airfield-wise, maintenance facility-wise, and so forth, than many of the places we are currently using.

General Ferguson is examining this to see if perhaps some adjustment of our base posture would be a wise thing to do; we could perhaps close one of the older bases that is less useful to us and transfer

the mission into Patrick.

Alternatively, we are, by direction of the Bureau of the Budget, working with NASA to look at the possible transfer of activities over to NASA whereupon the Air Force would become a tenant on the base.

None of these, of course, are going to occur in the time-frame of fiscal year 1971, but I think it is a very pertinent question for the future and one which unquestionably will change the character of ETR and Patrick Air Force Base.

DEFERRED PROJECTS AND REDUCTION OF 1971 DOLLAR REQUIREMENTS

Senator McIntyre. How much of your total fiscal year 1970 R.D.T. & E. program is deferred by the Secretary of Defense as of February 28, 1970?

General Glasser. \$334.6 million as of February 25.

Senator McIntyre. Because there are only three and a half months remaining before this year ends, this fiscal year ends, doesn't the delay in the release of these funds permit their carryover in part to help finance the fiscal year 1971 budget?

General Glasser. May I ask the Director of the Budget, General

Pitts, to handle that, please, sir.

Senator McIntyre. All right. General Pitts.

General Pitts. I'm sorry, sir. Would you repeat the question?

Senstor McLyrype The \$334.6 million has been deferred by

Senator McIntyre. The \$334.6 million has been deferred by OSD-

General Pitts. Yes, sir.

Senator McIntyre. Because there are only three and a half months remaining before this year ends. Doesn't the delay in the release of these funds permit their carryover in part to help finance the fiscal year 1971 budget?

General Prits. No, sir. Those funds will be needed for ongoing programs this year. I can enumerate some of the major items still deferred but——

Senator McIntyre. We would like to have a list of those items pre-

pared.

General Prits. All right, sir. I will furnish it for the record or I can give them at this point.

(The information follows:)

LIST OF PROGRAMS DEFERRED AS OF FEB. 25, 1970

[In thousands of dollars]

Program element	Title	Amoun deferre
01004F	International Mil Hq	474
11213F	MINUTEMAN Squad	97. ďó
1214F	MICCS	9, 80
2410F	AWACS	20, 00
2417F	CONUS OTH	2.76
2816F	Program 949	6, 70
7214F	RF-111	2.00
7412F	Tac Air Control Sup	1, 50
8012F	Defense Comm Plan	1,00
1014F	100th SRW	8, 20
1015F	Tech Sensor Col	3, 00
15114F	TRACALS	90
5121F	MOL	1.00
1102F	Defense Research Sciences	3, 84
2404 F	Space Studies.	80
3207 F	Adv Fire Control	1.00
3216F	Adv Turbine Engine	2, 50
3217F	AMSA	100, 20
3225F	SCAD	8. 56
53229F		2, 50
53229r 53230F		2, 00
53305F		2, 00
3308F		5. 60
3314F	Short Range Tac Air to Air Bomber Def Missile	2, 10
3314F 3706F		2, 10
		3.00
3231F		2,00
3730F 3732F	Missile and Space Def.	2,00
	Project MALLARD.	4.00
4206F	F-4 Avionics	2, 00
4211F	AX Aircraft	
4212F	Aircraft Equipment	7, 10 50
4214F	Adv Tanker	
4301F	Tac AGM Missile (MAVERICK)	1, 00
4704 F	Tac Jamming System	40
4709F	Lt Wt Precision Bomb	1, 50
4711F	System Survivability	. 70
4712F	Arm/Ord	1, 02
4724F	Truck Interdiction	10, 00
5101F	RAND	2, 20
5701F	Test Instrumentation	60
5805F	Development and Test Support	13, 90
	Total	334, 68

The final FY 1971 program budget was developed in December. Thus the Air Force was able to consider the use of some FY 1970 deferred funds to off-set requests for funds in the FY 1971 budget. Examples of this action are AWACS and AMSA which, together constitute a fair portion of the deferred funds. The funds which are deferred on the MINUTEMAN program are required to fund the remainder of the aproved FY 1970 program. Unless individual program efforts are delayed and/or cancelled, efforts budgeted for in FY 1970 and in FY 1971 cannot be financed at a lesser total.

Mr. Fine. The programs that are represented by those deferrals were established in those amounts at some earlier time. Certainly not later than last December and probably earlier than that in some cases.

The plan at that time would have been to have obligated those funds in some cases earlier than now, I expect. Therefore, it would not have been possible to have adjusted the 1971 budget requirements in some instances to reflect that slippage, and I would expect that to some extent some of these deferrals will permit the reduction in

your 1971 dollar requirements.

General Glasser. May I help answer this if I may, please? There are a couple of very large items that are included here. For example, B-1 at \$100 million and MINUTEMAN at \$97 million, where precisely what you say is in the Air Force planning. We knew when we would be able to implement the B-1 at the time that we were putting the budget together because we knew how the CD was going and when the decision point would be available. As we discussed earlier in the hearings here, our 1971 request and the schedule that we were working on the B-1 are based on the fact that there are \$100 million of fiscal year 1970 funds that are going to be available. The same thing is true of the MINUTEMAN program. The funds that we are asking for in 1971 are founded on the premise that the \$97 million of fiscal year 1970 funds currently deferred will be released prior to 30 June of this year.

Those two items alone are nearly \$200 million worth of the \$334

million deferred at this point.

Mr. Fine. Setting those items aside, in providing the list of individual items that make up the balance, would you indicate individually whether it is possible as a result of a delay to reduce the 1971 dollar requirements for the follow-on effort?

General Glasser. We will do that.

(The information follows:)

The individual programs with deferred funds are tabulated in the previous answer. Since the FY 1971 budget was based on the basic assumption that the deferred FY 1970 funds would be made available in the third fiscal quarter for use during the 4th quarter, no FY 1971 program can be reduced as a result of this delay in the release of the FY 1970 funds. Further, as previously indicated in our final negotiation with OSD on the FY 1971 RDT&E Program in late December consideration was given to the utilization of the FY 1970 funds. i.e., AMSA, AWACS, SCAD, etc. The key point is that the end requirements dates have not been changed; however, all funds required in the two year period of FY 1970-1971 should be budgeted as indicated. Only unexpected delays in approval or contract initiation would cause FY 1970 funds not to be obligated as scheduled.

OPERATIONAL SUPPORT PROGRAM STATUS

Senator McIntyre. There are five program elements which have been identified as Operational Support which combined reflect a total of \$64.3 million for fiscal year 1969, \$45.9 million for fiscal 1970, and \$42.8 million for fiscal 1971. In the past these programs have largely supported Southeast Asia requirements, which reasonably may now be expected to decline.

However, a number of significant new elements have been established for work which previously was appropriated to the Operational

Support category.

These include, for example, Truck Interdiction for \$10 million and

Tactical Electronic Operation Support System for \$2 million.

Now, isn't this an obvious effort to continue a high level of support for a limited war development which should be expected to decline as our participation in Vietnam is reduced? General Glasser. No, sir. I believe that is a misinterpretation of intent. As you indicated, the programs have in the past, but I would have to say the recent past, been largely in support of Southeast Asia—that is, the basic line items themselves. I personally was involved in dedicating these line items in recent years to the support of Southeast Asia, and there have been a number of significant items, for which these moneys have normally been spent in the longer past, in support of the operating forces that have gone begging while Southeast Asia has been underway.

So I would first disagree with the conclusion that the need would disappear with the disappearance of Southeast Asia. I think this need

will be ongoing.

As to the other comment of pulling out certain line items as a means of inflating or keeping up an inflated program, that is not the intent either. The kinds of items that have been pulled out are those which have reached a state of activity where they are too large to be buried in an operational support line item were there aren't separate program elements or separate Program Element Monitors to watch them. They have been assigned separate elements for the purpose of identification and visibility; or, where a collection of projects exist which all address the same end objective they have been brought out when it is felt that that end objective should be highlighted in a separate program element and have a program element monitor.

They could be handled either way. They could be pushed back in, as we discussed yesterday on the item called Truck Interdiction. That is one of those that was pulled out of that area and now enjoys separate identification. However, I don't think that would alter the funding

involved.

Mr. Hansen. Mr. Chairman, if I might amplify, I feel very strongly that a lesson of Southeast Asia is that we need greater capability for limited war effort. Nuclear war is obviously an alternative which none of us want. Therefore we would expect that the kind of business involving the Armed Forces might more likely be limited wars. Therefore, I believe that we should increase our research and development work in limited war and develop better ways to do it, to extend the lessons from the environment of Vietnam to the kinds of environment that might be experienced in other parts of the world, and to improve the capability that we have in this area.

It is my personal analysis that during the period when we depended almost entirely upon strategic nuclear deterrence as our way of keeping peace, I feel that we neglected the conventional warfare development. We paid the price for that in part in Southeast Asia and will pay it again if we don't get busy and bring the technology of that area up to where it will permit us to be able to do whatever we need to,

wherever we need to in the world.

APPROPRIATE FUNDING OF BUDGET ITEMS

Senator McIntyre. Mr. Secretary, what do we now have in the R.D.T. & E. budget which you feel is more appropriate under other appropriations? Or maybe I should put it this way. What do you now have in the R.D.T. & E. section of this budget which you feel is more appropriate under Procurement?

Mr. Hansen. Well, our R. & D. budget is constructed under the guidance which we now have from the Comptroller's shop about what ought to be there. It is my personal view that an example of something which is in R. & D. and ought to be in Procurement is the test aircraft which are used only temporarily for a test and then put into the operational inventory that are financed out of the R. & D. budget.

This is true in the F-15 program, for example.

Senator McIntyre. Could you look over that budget for any areas where you think that you have items that are carried in R.D.T. & E. that belong over in Procurement or O. & M. and also the converse?

General Glasser. We do have some items that are in the R.D.T. & E. budget that very likely could be put in O. & M. I would offer a caution, if I may, sir, in dealing with this, that we would hate to be run down between bases.

Senator McIntyre. No. I don't think I want it for that reason. I

simply want it in order to-

General GLASSER. No, sir. My meaning is that I would hate to be inadvertently trapped by having money removed from the R.D.T. & E. appropriations and told this is more properly in the other appropriations, only to have a Comptroller General ruling that that can't be used for that purpose. We then would find ourselves with neither money.

Senator McIntyre. We won't move any of the items around. I want it just for a talking point. Every now and then it occurs to me that R.D.T. & E. is getting stuck with something that shouldn't be appropriately R.D.T. & E. As I try to defend this budget of ours, it is a little akin to my getting quite irrational for State Department not doing things that you may think they should be doing, and you people and your equipment and your jobs have to be looking at. It also runs to the Commerce Department dropping out of a joint ship program and saying let them carry the ball. It is along that line, and by the same token that I should be aware of in the converse of the situation, too, where items that are in Procurement more appropriately should be in R.D.T. & E.

Yes, General Pitts?

General Pitts. Mr. Chairman, I might give one specific example that I think will illuminate the question very clearly; the Secretary alluded to the Comptroller having put some F-15 aircraft in R. & D. This occurred as a result of action by the DOD Subcommittee of the House Appropriations Committee in reference to the Navy F-14 during the passage of the fiscal year 1970 appropriation bill.

The Navy had identified certain aircraft that they planned to use for test purposes but later put into the operational fleet. The subcom-

mittee decreed that they be placed in the R. & D. account.

Having received that message, when we formulated the 1971 budget, we identified 12 aircraft that were truly test aircraft for the F-15 program. An additional eight aircraft are needed for CAT-2 testing, to be accomplished after the first models are brought out. It was our position that after the CAT-2 testing those eight aircraft would be returned at a later time to the operational fleet, Tactical Air Command.

Having noted the action, though, of the subcommittee we put those

eight aircraft in the R. & D. account.

Now, a possible alternative on this issue might be to enter in the Aircraft Procurement Appropriation a line item, "Test Aircraft," with the full understanding that these aircraft would be used, after certain testing, by the Operational Command. We can elaborate on some other examples for the record.

Senator McIntyre. I realize that you have all kinds of bosses here in the legislative session as I found out last year when I went to the conference for the first time. But even as far as I am concerned, it would be helpful to have a little glimmer of what this is about.

General Pirrs. Yes, sir.

Senator McIntyre. And see—where it first popped up, when it hit me, was the area of responsibility. Last year we had the MBT tank. Some of the funds were in procurement and some in R.D.T. & E., and that occurs more frequently than you suspect, and it isn't a question of who was responsible for trying to handle this on the floor, who brought this forcefully to my attention, but it is a matter of interest; and even though the Defense Subcommittee on the Appropriations Committee of the House may take a different position, I would like to have it for my own information, the information—relaying it to the full committee and the Senate. But I need to have the converse of it, too.

General Pres. Yes, sir.

Mr. Hansen. We will review, as you requested, all of the items and give you for the record any items in addition to the one that we already mentioned.

(The information follows:)

There is only one additional item that could be considered for funding in

other appropriations rather than in the RDT&E appropriation.

Base support costs for the Air Force Systems Command could be funded under the Operation and Maintenance appropriation as are the base support costs for the rest of the Air Force. This would include base housekeeping costs—not the technical effort of personnel who are carrying out the mission of the Air Force Systems Command. A study is now under way to identify the part of AFSC's costs which fall in this category. The operating costs of HQ AFSC could also be funded under the Operation and Maintenance appropriation.

There are no areas in other appropriations which, conversely, should be

included in the RDT&E appropriation.

Senator McIntyre. Will you kindly provide for the record what your reports show as of January 31, 1970, for the following items of information aggregated by program year and total program, cumulative obligations, unliquidated obligations and unexpended balance. Will you also provide comparable data as of January 31, 1969, and January 31, 1968. Do you understand that request?

General Prits. Yes, sir.

Senator McIntere. Is that going to entail a great deal of work? General Pitts. We can supply that for the record, sir.

(The information follows:)

R.D.T. & E., AIR FORCE
[In millions of dollars]

Program year	Total program	Cumulative obligations	Unliquidated obligations	Unexpended balances
ın. 31, 1970:				
1970	3, 310, 5	1.823.5	905, 7	2, 392, 6
1969	3, 668, 3	3, 595, 5	380. 7	453, 5
1968	3, 624. 5	3, 621, 0	132.9	136. 4
1000	3, 482, 4	3, 461. 0	39. 5	60. 9
1000	3, 635, 1	3, 631, 1	16.0	20. 0
	3, 508, 1	3, 506, 7	8.8	10. 2
		3, 976. 5	4. 9	5. 5
1964	3, 977. 1			2. 2
1963	4, 118. 3	4, 117. 7	1.6	
1962 and prior	9, 026. 3	9, 026. 0	. 5	. 8
n. 31, 1 969 :				
1909	3, 608, 3	2, 177. 4	1. 145. 2	2, 576. 2
1968	3. 63 7. 1	3, 572. 5	402. 9	467. 5
1967	3, 489. 2	3, 468. 8	135. 7	156. 1
1966	3, 642. 6	3, 637. 1	63. 3	68. 8
1965	3, 510, 5	3, 508. 4	19.7	21.8
1964	3, 979. 5	3, 977, 3	10.7	12.9
1963	4, 119, 3	4, 118, 2	3. 0	4, 0
1962 and prior	9, 026, 7	9, 025, 9	1. 2	2.0
n. 31, 1968:	5, 525	0,		
1968	3, 69 3, 2	2, 393, 8	1, 336, 8	2, 756, 4
1967	3, 503, 0	3, 423, 8	475.4	554.6
1966	3, 653, 3	3, 640, 5	186. 3	199. 1
	3, 514, 9	3, 508, 0	41.1	48. 0
	3, 984, 2	3, 981. 3	23. 2	26 . 1
	4, 122, 1	3, 361. 3 4, 119. 7	23. 2 8. 3	10.4
1963			3. 8	5.8
1962 and prior	9, 028. 8	9, 027. 2	3. 6	3. 8

DCPG PROGRAM INCREASE

Senator McIntyre. Now, in your estimate for MITRE Corp., one of the FCRCs, you show an increase in support of the Defense Communication Planning Group from \$2,599,000 in fiscal 1970 to \$2,750,000 for fiscal 1971. Why is this increase needed if the total DCPG program remains level at \$14 million for both years?

General GLASSER. Sir, the DCPG line item is handed to us by the DCPG office under Lt. Gen. Jack Lavelle. We put into our budget the requirements as they specify them and then—the work is done

at their call.

I don't have the specific answer as to why that number has gone up at this time. We would have to go to General Lavelle and ask him, but it is a rather small percentage change and I would expect there could be that much fluctuation in his program from year to year. I really don't know. We will have to go ask him. Either you could ask him or we will for you and submit it for the record.

This is the Defense Communications Planning Group who are in the Defense Agency DCA. They are the people who tell us how much money need be financed by the services. They tell us what their program is. We in turn are required to include it in our budgets. Then as they have requirements throughout the year, they levy them back on us as to how we shall spend that money. That is the \$14 million.

Now, they have told us that they expect us to spend \$2.75 million of that through the MITRE Corp., which is their principal technical supporting agency. In fact, a very significant part of their staff over here in Arlington is provided by an element of the MITRE Corp. So I would have to go to them and say the subcommittee is interested in their growth.

Senator McIntyre. Mr. Fine.

Mr. Fine. Are you saying in effect that whatever they state their requirement is is a directive on the Air Force?

General GLASSER. That is right.

Mr. Fine. And you must accommodate that within the total program?

General Glasser. That is correct.

Mr. Fine. Since it is in the Air Force program I think it would be appropriate for you to obtain the information.

General Glasser. I'm sorry.

Mr. Fine. I say since it is in the Air Force budget, don't you feel that it is appropriate for you to obtain the information and provide it for the record?

General Glasser. We will be happy to do that.

Senator McIntyre. I would appreciate it if you would.

(The information follows:)

The FY 1970 DCPG tasks assigned to MITRE required the effort of 55 Members of the Technical Staff (MTS) at an estimated cost of \$2,599,000. The anticipated DCPG tasks to be assigned to MITRE in FY 1971 will also require 55 MTS. In order to maintain a constant level of MTS the estimated cost in FY 1971 is \$2,750,000 which is an increase of approximately 5% necessary to cover cost-of-living increases.

In the event the requirement for MITRE support to the DCPG is adjusted, the Air Force requirement for MITRE support will be adjusted accordingly.

PRELIMINARY DESIGN-DEVELOPMENT PLANNING REQUEST

Also under MITRE you show \$2,100,000 for support of the preliminary Design-Development Planning Program in fiscal year 1971 with no funds in fiscal 1970. What is that for?

General Glasser. This is because of the arrangement that we operate under with the FCRCs. Some years back there was a principle in operation that placed a congressional limitation on the amounts of money that could be spent with the Federal Contract Research Centers. This was imposed by Mr. Mahon of the House Appropriations Committee. All of the services were required to work with their FCRCs within that aggregate total of "ceiling" as it was called for those purposes.

If any of us had a job that came up in one of the FCRCs that had to be done there, we had to have the ceiling as well as the dollars to go along with it. We had to borrow ceiling from one FCRC or from one

service in order to finance the other one.

That has not been in effect for the last few years but the Director of D.D.R. & E. has taken on the personal obligation to continue this control in effect so as to preclude further growth of the FCRCs. Accordingly, each year we are required to indicate to him, in addition to the line item for which we are requesting funds, at the same time the amount of ceiling we anticipate using with that contractor and for what purposes.

The items that you are questioning here are things that are estimated to be required this year and for which ceiling will be required. They have not yet been identified but historically they have been determined to come up as needs during the year. We are not asking for funds. We

are just saying this is the amount of effort that we expect to be doing in MITRE.

Mr. Fine. How can you say historically when there has been no requirement for this program element to be supported by MITRE in prior years?

General Glasser. This is not a program element. I'm sorry.

Mr. Fine. The program element—there is a program element here and the dollars that go to MITRE are derived from that program element.

General Glasser. Let me ask Colonel Hoermann to try.

Colonel HOERMANN. Mr. Fine, they didn't know what to put down when they submitted the request from ESD and MITRE, and so although the title says Development Planning and reads the same as the program element we have in the budget, there is no association. It is a type of work that would normally be done under the Development

Planning.

For example, we were forced to do the preliminary development work on AWACS from within the MITRE line element. There is a possibility in this coming year that we may do some work on management information for MAC, in order that they will be able to do a better job of managing industrial funds. This has not been firmed up but should it be, this \$2.1 million will be used to offset some of the cost.

The ceiling part of it I should say-

Mr. Fine. You haven't identified these dollars as for ceiling only. Colonel Hoermann. That is right. Based on experience we anticipate requirements from MITRE support amounting to about \$2.1 million will originate during the year. This work will be of a planning or design nature. The funds for this work will probably have to be reprogramed or funded from Program Element 63101F. What we were trying to describe in our submission was a functional description of work that we know from experience will develop during the year.

General GLASSER. In this context they are for ceiling only.

Mr. Fine. You have a separate line in the FCRC summary which indicates "for ceiling only" and which doesn't request dollars. That is not part of that same item. In effect, if I understand you correctly, you have two "for ceiling only" items in that sense, or perhaps—

Colonel HOERMANN. That is right. We also have more than one

FCRC. We have Aerospace, Rand, and-

Mr. Fine. The \$4 million-odd that appears as "for ceiling only," this in effect is for ceiling purposes, not for a request of dollars, which may be available for all FCRCs.

Colonel Hoermann. That is right.

Mr. Fine. And what this indicates perhaps more accurately is it is an unknown part of what minor effort you expect you will have to support based on their manning program for 1971, but you feel that based on experience there will be requirements generated which will have to have the application of these resources.

Colonel Hoermann. That is right, and we will have to come over here with a reprograming. As I say, we have talked with some of the major Air Commands and have a feel for what they are going

to ask in coming here.

USE OF RAND CORP. FUNDS REQUESTED

Senator McIntyre. What do you plan for Rand Corp. to do with \$75,000 support which shows up for the first time in fiscal 1971 for environment?

General GLASSER. What did we plan to do with it, sir?

Senator McIntyre. Yes. What did you plan for Rand Corp.?

General GLASSER. We plan to have it put back into the line item of Project Rand, if that is the sense of the question.

Senator McIntyre. We would like to know what you have in mind

for \$75,000.

General Glasser. The work that will be done?

Senator McIntyre. That is going to the Rand Corp. showing up

for the first time in fiscal 1971 for environment.

General Glasser. This is an effort that has not previously been supported by another contractor but in the performance of their regular Rand Corp. work, they have some meteorologists from their Department of Environmental Sciences that have picked up a considerable amount of knowledge on weather effects on Air Force combat operations and operational procedures for the Air Weather Service. What this is for is to take advantage of this know-how that Rand has.

Senator McIntyre. Under the FCRC Applied Physics Laboratory, Johns Hopkins, you show requirements in fiscal 1971 for Defense Research Sciences, \$25,000; Aerospace Propulsion, \$200,000; and Aircraft Equipment Development, \$500,000. Will you identify these efforts and explain why they require the unique capability of this Center.

General GLASSER. Do you want that for the record, sir, or would you

like to----

Senator McIntyre. I am ready to settle for the record right now.

General GLASSER. Let me say just very briefly that these all happen to be areas where there has been identified an individual or laboratory in Johns Hopkins that has very unique capabilities for projects that the Air Force needs. I will expand on that in the record if you would like.

(The information follows:)

Defense Research Sciences, \$25,000

Geomagnetic Studies—Effort consists of studies of micropulsations, hydromagnetic propagation and aligned currents of the auroral oval. The APL Johns Hopkins research is a continuing study of basic magnetospheric physics which Dr. A. Zmuda is particularly qualified to direct by reason of his access to the necessary Dodge Satellite and ground magnetic data required for this analysis and his pre-eminent experience in this highly specialized field of hydromagnetic and auroral phenomena.

Aerospace Propulsion, \$200,000

Effort consists of evaluation of storable fuel for supersonic combustion ramjets. The program at APL is the continuation of previously sponsored research in two areas of supersonic propulsion technology. One area involves the selection, on the basis of physical characteristics and combustion efficiency, of optimum liquid fuels for use in supersonic combustion ramjets. The other area consists of a study of the physical process of injecting such a fuel into supersonic airstream so as to maximize combustion efficiency.

APL was selected for this work on the basis of the outstanding qualifications of its personnel, whose experience dates back to the earliest days of missile propulsion development, and its possession of unique facilities for the work, particularly with respect to its high-capacity arc-heater used to simulate the air-heating problem experienced in supersonic flight. An additional benefit ac-

crues from the concurrent existence of closely related but not identical programs sponsored by the Navy and NASA; which provide economies in facility operations, instrumentation, and special test equipment.

Aircraft Equipment Development, \$500,000

The Pave Crow Program involves the continued development and application to specific aircraft of a technique of detection and interdiction of ground vehicles through the use of airborne sensors. This technique was originated by APL and initial visibility established under ARPA funding. An engineering model was transferred to Air Force accountability and has been in active use in the SEA theater since mid-1968. The Fiscal Year 1971 program contemplates the incorporation of performance improvements and the production design of tactical equipment suitable for industrial procurement.

This work is intended to be performed at APL since the laboratory not only originated the concept but has consistently pioneered improvement to the system's performance. Closely related work being performed for ARPA has immediate application to further design improvements at a high competence level in systems' performance. The laboratory has freely shared its technological progress with industrial sources as requested by the Department of Defense. Comparative product tests with equipment furnished by industrial sources have clearly demonstrated the superiority of the laboratory's technical achievements.

WESTERN TEST RANGE REIMBURSEMENT

Senator McIntyre. All right. Your installations analysis for the Western Test Range shows a total program which I understand includes anticipated reimbursement, decreasing from \$77.6 million in fiscal 1970 to \$73.4 million in fiscal 1971. However, your direct program shows an opposite trend, from \$63.5 million to \$67.5 million for those same years. Will you explain that for the record?

General Glasser. I had better do so, sir. I don't have that in my

head.

(The information follows:)

The decrease in the AFWTR total program between FY 1970 and FY 1971 results from a decrease in the amount of reimbursement expected from NASA. The decrease in reimbursements is brought about by the release of two of the Apollo ships (the USNS REDSTONE and MERCURY) and the transfer of the final Apollo ship (The USNS VANGUARD) to full NASA operation during FY 1970. Prior to this, AFWTR was reimbursed by NASA to operate these ships. The offsetting rise in the RDT&E program from \$63.5 million in FY 1970 to \$67.5 million in FY 1971 is primarily due to the activation and buildup of a new land based terminal instrumentation site in the Pacific Ocean to support the testing of the MINUTEMAN III ICBM.

ELECTRONIC WARFARE SYSTEMS RESEARCH

Senator McIntyre. I won't keep you much longer, gentlemen. Under "Electronic Warfare Systems," which involves a request for \$12 million, what is the Air Force doing in this area in R.D.T. & E.? Haven't you pretty well decided what the different modes or ways you tackle this problem are? What are we researching here now?

General GLASSER. The electronic warfare systems is perhaps the most dynamic of any of the development areas that we have on our books, and I might add that this was the most overlooked area that we had up until we were very vividly faced with the problem of the SA-2 SAMs in Southeast Asia. So we simply have to stay aggressive in this area and do a lot better than we have in the past. Electronic warfare is one of the things where every time we develop a technique the enemy counters it, and then we have to figure a way of

countering his countertechnique. So that I would reject the notion that because we have done so much in this, that we ought to be up to some level.

It is one of those things that will never be completed.

CRYPTOLOGICAL ACTIVITY EXPENDITURE

Senator McIntyre. I can't understand for the life of me why the services always spend so much money on R. & D. in the area of cryp-

tological activity.

General Glasser. I guess I can't either, sir, but this comes from the people who work in those areas and it is a very expensive area. It is another of the areas that has some analogies to the one that I just described. Each passing year you have to develop new techniques to match what the target of your activities is now doing. It simply requires continuing research and continuing development to stay ahead of him as he changes his transmitters, his transmission techniques, his cryptic techniques, and his signal confusing techniques. All of these cause us to have to do more and more things, and it is a very tightly organized program among the three services. What you are seeing in the Air Force is an element of an overall cryptologic program that is carefully organized by the National Security Agency to see that they are integrated and make sense.

CHEMICAL WARFARE

Senator McIntyre. Tell me, what are you gentlemen doing in research and testing and evaluation and development fields of chemical warfare for fiscal year 1971?

General GLASSER. We have a program, if my recollection is correct, that is \$1 million for fiscal year 1971. For the most part this is in support of defensive capabilities: that is, the care and protection of our own personnel against the possible use of chemical or biological

warfare by the enemy.

Under the President's policy we are also to have the capability to retaliate with chemical warfare in the event of a first-strike chemical attack by the enemy. However, we have been looking very carefully to see whether what we already have is not adequate. There does exist in the program a device called a Binary Munition which is a nontoxic device until it is employed, at which time the chemicals mix and it becomes toxic. We are currently reviewing this munition to see whether, (1) it is truly required and useful, and (2) does it truly fall within the President's guidelines.

Senator McIntyre. Would you say most of the work you are going to do in this area is, for lack of a better term, I will say "software study" and looking at it and perhaps keeping your men abreast of

the changes that are taking place?

General GLASSER. It does include the investigation of equipments for defensive measures, protective clothing, alarms, and things of that sort

Senator McIntyre. We will have a briefing on that because I have only seen one item in your budget that refers to this chemical warfare.

General Glasser. We have only a single item, \$1 million. The bulk of the effort is done through the Army.

Senator McInter. I suppose that you gentlemen have got to be kept aware of what is going on, have people who are, you know, experts in it, but it looks to me like Army ought to take this over and be worrying about what kind of equipment and protective clothing you should have, and I am sure their budget must show a line item on that.

General GLASSER. If I might go off the record, sir— Senator McIntyre. Go off the record if you want to. (Discussion off the record.)

COBRA MIST RADAR PROGRAM

Senator McIntyre. Back on the record. What is Cobra Mist? That

is a program in here for-

General Glasser. Cobra Mist is a radar program, over-the-horizon radar program. It is frequently referred to as FPS-95 located at [deleted].

ECBM DEVELOPMENT

Senator McIntyre. How about ECBMs? Where are you doing any work on that in the Air Force?

General Glasser. ICBMs?

Senator McIntyre. Electronic countermeasures.

General GLASSER. There are a number of areas in which ECM is done. One you mentioned, the Electronic Warfare Simulation Programs. A fair number of these occur in the QRC programs, not in the R.D.T. & E. areas in that case, and, of course, we discussed some of them yesterday. The F-4 avionics activity is in there; those projects are parts of the ECM program.

Mr. Fine. Is TEOSS part of the ECM program?

General Glasser. It is in a sense. It is part of the Electronic Warfare Program. We generally use Electronic Warfare as a more inclusive word.

Senator McIntyre. Would you please furnish me for the record where in your line items work is being done of the nature of research, development, testing, and evaluation on ECMs?

General GLASSER. On ECM alone or on Electronic Warfare as a

broad----

Senator McIntyre. I am thinking of the things you have to have in your airplanes to make them able to fly their mission.

General Glasser. Yes, sir. (The information follows:)

RDT&E of aircraft ECM penetration aids is accomplished under the following program elements:

P.E. 62403F Aerospace Avionics

P.E. 63718F Penetration Aids for Manned Aircraft

P.E. 64704F Tactical Jamming System P.E. 64705F Electronic Warfare Systems

ECM equipment is also developed as an integral part of weapon system development programs. For example, the ECM equipment for the F-111 was developed under the F-111 program. ECM equipment for the B-1 and F-15 will be developed under the programs for these weapon systems. ECM equipment developed under P.E. 64705F, listed above, is intended primarily for B-52 and F/RF-4 aircraft as well as other weapon systems on which development/production has been completed.

APPROACH TO LINE ITEMS BY DIFFERENT SERVICES

Senator McIntyre. Now, if my memory serves me right, the Air Force treats these Lincoln Laboratories and MITRE Corp. and RAND differently from the other services. Is that still true?

General Glasser. I don't believe we do.

Senator McIntyre. They are here as line items and they don't ap-

pear as line items in the other services. Why is this?

General GLASSER. I am unable to speak for the other services. We have historically carried these programs as line items and I thought that we were under common rules of management.

Senator McIntyre. Well----

General GLASSER. I'm sorry, sir. I can't answer for why the other services are different.

General Pirrs. The Air Force puts them in the budget to give Congress visibility in those line items, sir.

Senator McIntyre. Pardon me?

General Prrrs. The Air Force puts those FCRCs as line items in the budget to give the Congress visibility in those areas.

HISTORICAL BACKGROUND

Mr. Fine. That isn't really the genesis of the issue. If you go back far enough it was at the discretion of OSD that they elected to prescribe certain line items for these centers and the fact that the Air Force wound up with most of them I think is somewhat accidental. The other services are now required to provide the same detail as backup to show the various programs that contribute to the centers that are under their cognizance as the Air Force has done. This is being done for the first time and the only difference then will be the fact that they do not have line items that are directly funded as the Air Force does. This is really the only significance.

General Glasser. Perhaps I can go back in history and explain how

this occurred. Maybe that is what we are looking for.

Senator McIntyre. Yes. Please do.

General GLASSER. In very early times the FCRCs—all but RAND, I believe, and I would have to go check over my memory to be certain this is right—but I believe all of these others started out as being very closely associated with some funded line item project, like the Ballistic

Missile Program, the SAGE program, and so forth.

With the passage of time and with the expansion of the management structures that work on these—the ballistic missiles programs and air defense programs—it developed that the supporting contractors, Aerospace, Lincoln Lab, MITRE, and so forth, were doing work that was more than just the immediate ongoing effort on these particular programs. It was determined at that time that it was not appropriate to finance this additional work out of the line item element of ATLAS or TITAN or SAGE or whatever. And so there came to be a separate line item that was broken out as with Project Rand that said "this is the line item account of Aerospace," and "that is the area in which you will do in-house research, advanced planning, things of that sort," and "the work that is done in Atlas you will charge in Atlas and the work that is done in MINUTEMAN you will charge in MIN-

UTEMAN." This has become the practice that we have followed

ever since.

We have a line item which appears in the budget under the name of that corporation and all the other work appears within the element that supports that, but we do supply this listing that we were speaking of a bit earlier that says, "here are the areas where the rest of the money is coming from."

Senator McIntyre. Did you supply this last year?

General Glasser. We have supplied that every year for as long as I can remember.

Senator McIntyre. Well, the differences, you see, confused us last year, made it difficult to answer some questions sometimes on the floor

AIRCRAFT AND RELATED EQUIPMENT EXPENDITURE BREAKDOWN

Now, because it would be easier for you than it would be for me, the first four items under Aircraft and Related Equipment under Exploratory Developments are labeled Aerospace Flight Dynamics, Aerospace Biotechnology, Aerospace Propulsion, Aerospace Avionics. These total \$121 million in research, development, testing, and evaluation in the exploratory development field.

I don't have any idea how large a job that would be, but I would just like to know how you spend that \$121 million and where you are spending it. Probably after you gave it to me I wouldn't understand some of the terminology but would be acquainted with it. Is

that broken out somewhere?

General Glasser. Yes, sir. It is broken out in your descriptive summaries.

Senator McIntyre. I don't always find those summaries—

General Glasser. Not very descriptive, sir.

Senator McIntyre. Well, you see, they are in a language that I am not too familiar with. I am beginning to know what an airframe is and aerodynamics. They winded us to death I remember when I landed on the carrier *Enterprise*.

General GLASSER. General Gilbert is here who is the Director of Laboratories and who is responsible for managing all of these projects you described. Would you like to hear from him for a moment?

Senator McIntyre. All right. Let's see what happens.

General Gilbert. Well, sir, these moneys, first, as I think you recall, pay for the salaries of civilians that operate the plant. I think under each of those line items in your project listing you will find an item that begins with 06, which indicates roughly the amount of money and in the backup you will also find a breakdown of the number of people, and so forth. Then I can—in each of these projects I can go through and give you a brief summary of what the project is for, if you wish to address any specific title—tell you roughly what sort of things have been done in the past in general, what we are doing in 1970, and what we would propose to do in 1971.

I have it broken down for each individual project regardless of size. I think it might take a fair amount of your time to go through it, sir, and so I would hate to start through in the detail that I have

at my fingertips.

Senator McIntyre. Is it true that that \$121 million is mostly salaries, substantially salaries?

General GLASSER. Salaries, in-house work, and supporting contracts. Senator McIntyre. It is done in many, many different laboratories in-house?

General Glasser. Yes, sir.

General GILBERT. Sir, each one of those line items except biotechnology is a laboratory. The first item "Flight dynamics" covers the Air Force Flight Dynamics Laboratory. It happens also that three of these laboratories are at Dayton—Flight Dynamics, the Air Force Flight Dynamics Laboratory; Aerospace Propulsion, the Air Force Aero Propulsion Laboratory, and Aerospace Avionics, the Air Force Avionics Laboratory. The Aerospace Biotechnology covers the costs that are chargeable to R.D.T. & E. for the operation of the Aerospace Medical Division which comprises at the present time three laboratories, the Aeromedical Research Laboratory at Wright Field, the Aerospace Research Laboratory at Holloman which we are planning to phase out, and parts of the School of Aviation Medicine at Brooks Air Force Base.

Now, a fair amount of that money is for salaries but I don't have at my fingertips exactly what fraction of each line item is for salaries. I believe this information is contained in "Justification of Estimates for Fiscal Year 1971" provided to you in January of this year.

Senator McIntyre. Now, at all these laboratories what are they doing, working on planes of the future or problems that are cropping up on—

General GILBERT. Yes, sir.

Senator McIntyre (continuing). On the F-111? Just what are they

doing out there?

General GILBERT. Sir, they have a number of responsibilities. The first responsibility is to do research both in-house and on contract to provide future capabilities for the Air Force and more than the Army and Navy we are dependent on out-of-house contracts, using universities, not-for-profit organizations, and industrial concerns to do our research.

With the salaries and the moneys going toward in-house work, we provide the support for the advanced development programs that the laboratories manage, a few engineering development programs, and all the support we provide to the weapon systems organizations. The F-111 is a case in point. The people in the Flight Dynamics Laboratory are heavily involved right now in structural analysis of the problems of the F-111 and the implications that come out of that structural analysis for the design of, for example, the F-15.

There are also some problems that you are aware of in the C-5 and the Structures Group of the Flight Dynamics Laboratory is con-

cerned with those.

For example, the Flight Dynamics Laboratory is concerned with structures, with the dynamics of structures, with the flight controls to control those structures, with aerodynamics and flight mechanics leading to design of new types of structures and preparing handbooks to give to contractors on what Air Force specifications are. They are concerned with such things as the instruments an aircraft, special equipment (which includes the landing gear, control surfaces, etc. and

the use of new materials to make lighter structures for aircraft, tor

example.

We are looking at the downstream use of composite materials which we hope will give us an airplane that is somewhat stiffer and therefore easier to control from the standpoint of aerodynamics and flutter problems, and also one which is perhaps 30 percent lighter—if we use our imagination perhaps even 50 percent lighter—for the basic airframe structure in the future.

That is generally the sore of thing that is done by the Flight Dy-

namics Laboratory.

Biotechnology is concerned primarily with the interaction of man and systems, how man lives in the environment in an aircraft, an environment which changes with changes in altitude. We do try to pressurize our cabins but not up to full pressure. What happens if we lose pressure at altitude? How does a man survive at that altitude? What happens if the heating system goes out? How does he operate in that kind of environment? What does he do in high g environment when he is pulling a lot of g's, either negative or positive? What is the effect of these combined stresses on a man? What happens when a man ejects from an airplane? What are the forces involved on the body? How much can he tolerate? At what speeds can be eject? What sort of protection does he have to be given?

Problems also arise like how does a man sit in front of a scope, a radarscope, to take the information off of that and provide the in-

formation to a decisionmaker about what should be done?

How many targets can a man track, and so forth?

In the case of Aerospace Propulsion we are concerned here primarily with the turbojet engine programs which form the basis of the propulsion for aircraft and perhaps for some subsonic cruise missiles of the future. Most of the development of the aircraft engines for, say, the F-15, the C-5, the B-1, have come out of work conducted or sponsored by this laboratory in concert with the aircraft industry.

We are also looking at new items such as the ramjets for possible applications in the future, either for missiles or for fighter-type air-

craft.

A fairly important, though perhaps mundane part of the function of that laboratory is also the question of fuels and lubricants. Can we develop other fuels in conjunction with the engines that, for example, alleviate the smoke problem? It is a pollution problem to some but it also provides a means of detection by the enemy of the presence of our aircraft. So it is important from that standpoint also.

We are concerned with the problem of advanced power systems for aircraft, for missile silos, for spacecraft, even such mundane things as how do we keep a battery operational for several months in changing environments for a man to use for a radio when he goes down in

order to communicate with the rescue aircraft?

We also have been doing some work in the past, though at the present time this is at a fairly low ebb, on nonchemical or electric propulsion systems, if you will, for stabilizing spacecraft, or for making small changes in spacecraft positions.

In the case of Avionics, this is where a fair amount of the work is done in electronic countermeasures, and in surveillance and reconnaissance. We cover quite a bit of the electromagnetic spectrum. An example in optics is the low light level television. We are concerned with communications, communications to and from aircraft, satellites and ground stations. We are concerned with things such as laser line scanners in order to pick up intelligence. We are also trying to combine the output of several sensors, infrared sensors, optical sensors, radar

sensors, side-looking radar, and that sort of thing.

That is kind of a general overview of the work covered in these four laboratories but I would be willing to prepare for the record as much detail, sir, as you might like to have. I believe that these programs are directed very specifically at Air Force objectives. I just recently have gone through a very detailed review of most of the work units of each of these laboratories to check for compliance with section 203 as we discussed yesterday, and I am completely confident that we can meet the test of any prudent man in terms of the question of relevance to Air Force objectives.

Does that confuse you, sir, or amplify?

Senator McIntyre. No. It generates other questions in my mind but I think I will stop right there. Thank you, General.

ROCKET PROPULSION

What about this rocket propulsion? What are we doing with rocket

propulsion for \$25 million?

General GLASSER. The Air Force are the pioneers of rocket propulsion, sir. That is the propulsion system for a large number of our missiles, spacecraft, and so forth. This is another one of the laboratories similar to those that General Gilbert just described, located at Edwards Air Force Base.

Senator McIntyre. Is that at Eglin?

General GLASSER. Edwards Air Force Base in California. It is on the back side of Edwards on the ridge out back. It initially pioneered in the development of large rocket engines, was used for the development of all of the rocket engines in ATLAS, TITAN, various space programs, the MINUTEMAN and subsequently was used primarily by NASA. All of the engines that were used in the lunar program were developed, tested at least, out in that area. It is a very sizable organization that is devoted strictly to rocket activities.

Senator McInture. \$25 million is again a fair amount for salaries? General Glasser. The major portion of the moneys out there end up being used for things like propellants and test activities because it does fire a lot of rockets. So there are a number of consumables.

I don't have in my head the breakout between these. The breakout as you can detect from the book here is that of the \$25 million for the overall project, \$9 million is used for the operation of the laboratory itself.

SALARIES

Senator McIntyre. How much of this R.D.T. & E. budget is salaries? General Glasser. Sir?

Senator McIntyre. How much of this R.D.T. & E. budget is wages and salaries?

General Glasser. I would have to break it out.

Senator McIntyre. Ten, twenty, thirty, forty, fifty percent? General Glasser. I can accumulate those data for you.

Senator McIntyre. I don't need an exact 46.9872. I just want to know what it is.

General Glasser. For in-house salaries, the percentage is roughly 11 to 12 percent.

Senator McIntyre. Not of the whole R.D.T. & E.

General Glasser. Of the R.D.T. & E.

Senator McIntyre. Of the \$7,345 million?

General Glasser. Sir, we only have \$2.9.

Senator McIntyre. Oh, excuse me. I was thinking of all the services. General Pirrs. About \$326 million of the total R.D.T. & E. budget, sir, for personnel, compensation, and benefits.

Senator McIntyre. A little over 10 percent.

General GLASSER. I would like to recheck that number because it appears in so many places. We have the ETR, WTR.

Senator McIntyre. You can correct it in the record. That gives me

a little idea.

General GLASSER. I would rather do that, sir.

Mr. Hansen. In a very summary way you can say that most of the money in the R.D.T. & E. budget goes to industry for research and

development projects and test activities.

Senator McIntyre. It seems to me that I have gone into that item, Special Activities, under Military "Astronautics and Related Equipment" before. It is a substantial amount, \$172.8 million. I won't inquire any further into that.

Tactical Jamming System, \$500,000. That is part of the ECM?

General GLASSER. That is correct, sir. That is an advanced system. Senator MoIntyre. What is this 100th Strategic Reconnaissance Wing, [deleted] million?

General Glasser. I would rather explain that at some other time, if I may, sir. That is related to reconnaissance but I can't go into a great deal more detail at this time.

Senator McIntyre. All right. We will get together later on that.

PERSONNEL RELATED ITEMS

These last items, Programwide Support, total of \$305 million. Now, is a great deal of that salaries? I am talking of your last page here now on—

General Glasser. Salaries and personnel related items.

Senator McInter. This is the U.S. Air Force Flight Test Center, Calif., U.S. Air Force Missile Development Center, N. Mex., U.S. Air Force Special Weapons Center, N. Mex.—very substantially salaries. We need to know that. You know, we might cut you 20 percent here. This gets us into an awful lot of difficulty.

General Glasser. That will get us into a great deal of difficulty.

Senator McIntyre. That came up last year. What were we cutting? Somebody had the bravery to say to us what are we cutting, and I don't know. Are we cutting salaries?

Mr. Hansen. People and people-related cost are those last two

items.

General Glasser. And base operations.

Senator McIntyre. Are these mostly a great deal of contracts? When I run around here I find out Westinghouse has a contract. Who

runs Andrews § \$15 million. RCA or somebody has a contract. They run

the whole deal, operate the whole base.

General Glasser. We have some of those but they are not running bases. Within the ETR line item you will find a contractor, Pan American, who is operating the range, but those are not in this line item. The management support budget activity takes care of the pay of personnel and the related personnel costs like travel, per diem, supplies, stationery, and so forth. It also takes care of the maintenance and supplies to run the bases, the O. & M., and the flying-hour program that is associated with those bases. All of that funding is included in here.

General Pirrs. I might add, Mr. Chairman, that in the formulation of the 1971 budget, the figures you are looking at there, they address the fact that there was an approximate 1,000 space reduction taken in the formulation of the 1971 budget to arrive at that figure. So we have reduced this budget prior to coming over here in our request to OSD and there are a thousand authorizations that have been reduced out of this element.

Senator McIntyre. Does that affect that total figure of 305.4?

General Pirrs. Yes, sir.

Senator McIntyre. Could I have that later?

General Glasser. That is what he is saying was done to arrive at

General Press. That is the resultant figure.

General Glasser. That was what was done to arrive at that figure.

PREPARED QUESTIONS FROM SENATOR SYMINGTON

(Questions supplied by Senator Symington. Answers furnished by Department of the Air Force:)

Question. What is the urgency for the Congress to authorize funds for procurement of a missile system that is in difficulty in the development stage? Would not the current grounding of the FB-111 SRAM capable aircraft influence the SRAM program and, if so, to what degree?

Answer. If the procurement funds requested this year for SRAM are not made available, it will be impossible to maintain the subcontractor structure because of production gaps between the limited development quantities and the production program. This may result in the need for subcontractor re-qualification and increased program costs. Based on recent development flight testing we are confident that the SRAM will perform its mission very satisfactorily and that it will be ready to go into production during fiscal year 1971. We now feel that the difficulties we previously encountered, and which caused a two-year delay in production, have been corrected. The urgency for Congress to authorize funds for the procurement of the Short Range Attack Missile system is not influenced by the current grounding of the FB-111 force. The test bed aircraft is not grounded and is continuing to fly its development flight test missions. The SRAM itself is independent of the aircraft; however, we use the FB-111 test bed aircraft to demonstrate its supersonic carriage and launch requirements for the development program. This missile procurement funding will procure the FY 71 increment of SRAM required to begin fielding SRAM on the B-52G/H force as well as the FB-111 force later in the program.

Question. If the SALT negotiations result in an agreement between the United States and the Soviet Union to mutually ban MIRV testing and development, or further deployment of offensive or defensive missiles, would this new satellite strategic surveillance system provide more accurate monitoring of such an agreement than is now possible with current systems; and if so, how?

Answer. [Deleted.] Additionally, the Air Force has been working closely with the Arms Control and Disarmament Agency for several months examining the potential monitoring functions that this warning system will pro-

vide. ACDA is planning to utilize the initial warning information of missile launches and exo-atmospheric nuclear bursts for monitoring purposes. [Deleted.]

3. Testimony, p. 17: Re the F-15, the testimony states: "The contract incorporates our new 'milestone' approach under which the program is thoroughly reviewed at important phase points before major new amounts of money are committed."

Question. Are there any other Defense contracts which incorporate this new "milestone" approach; if so, please list.

Answer. The new demonstrated milestone procurement approach was designed for the F-15 Weapon system and is contained in that contract. It is not included in any other Air Force contracts. However, we are considering a similar approach in several system procurements which are now in various stages of source selection.

Question. In view of the Administration's announcement to deploy MIRV in June of this year and request for additional deployment of ABM, in addition to POSEIDON, is there any evidence of constraint on the part of the United States in its development and deployment of strategic weapons?

Answer. The United States is definitely constraining its development and deployment of strategic weapons. Present Air Force programs are directed only toward updating and modernizing strategic offensive forces, rather than expanding them. New systems will replace old systems, and in some cases, result in a reduction of total forces. The resultant capability will be in consonance with President Nixon's policy of sufficiency, rather than superiority.

The continued development and increased deployment of strategic weapons by the Soviets necessitate our force modernization to improve survivability, reliability and flexibility. Failure to do so, in light of Soviet efforts, might place us in an inferior position, not only in negotiating arms limitations with the Soviets, but also in maintaining our capability to satisfy the strategic sufficiency criteria. Increased numbers are not our goal, but we must have a force adequate to deter.

Therefore, the deployment of certain systems such as MIRV is continuing as previously scheduled. Other research and development programs, such as advanced ICBMs and MINUTEMAN Rebasing, are being pursued to develop possible means of maintaining the survivability and reliability of our deterrent.

Question. In that the statement says this deployment is post-Southeast Asia, what is the present location of the 23 tactical fighter wings?

Answer. At the present, [deleted] fighter wings dedicated to NATO are based in Europe and [deleted] additional wings are deployed to the Pacific—excluding Southeast Asia. [Deleted] wings of fighters are now serving in Southeast Asia. The remaining [deleted] wings are based in CONUS.

6. Testimony, p. 15: "The interdiction effort is our most significant current activity in Southeast Asia."

Question. Presumably this refers to the bombing of the Ho Chi Minh Trail in Laos. Would the second most significant activity of the U.S. Air Force in Southeast Asia be bombing in support of Laotian troops in the northern part of Laost Pleuse give the monthly sortie rates for the last six months, broken down according to those directed against the Trail and those in North Laos.

Answer. At the time of the testimony, the statement concerning the significance of air interdiction referred to our efforts throughout Southeast Asia, not just the bombing along the Ho Chi Minh Trail. At any one point in time, the second most significant activity of the USAF in SEAsia could be considered as bombing in support of Laotian troops in the Northern part of Laos. However, it must be recognized that the priorities of air missions in SEAsia shift as the result of interaction with the enemy. If the enemy chooses to emphasize resupply activities, as he has done most recently, the field commander's weight of effort moves toward the interdiction role to prevent these supplies from being used against allied ground forces. Conversely, if the enemy launches major ground offensives, the field commander shifts his forces to the close air support role to assist ground units in achieving their objectives and minimizing their casualties. Thus, the significance of the missions accomplished by air power is dependent on enemy intentions and the field commander's estimate of required action.

For your information, monthly attack sortie averages from November 1969 through April 1970 were as follows:

[Deleted.]

Classified Statement, p. 7: "Included in the total direct program are aircraft and related support items for the forces of South Vietnam, Thailand, and Laos (Provided through MASF)."

Question. Please supply breakdown of major items to be given each of these countries.

Answer. Regarding the Aircraft P-1, Line 7—[deleted] of these aircraft are F-5As. And [deleted] are RF-5s. All [deleted] are for [deleted] Line 22—These [deleted] T-37C aircraft are for [deleted]. Line 24—These [deleted] aircraft are the T-41D series. [Deleted] are for [deleted] and [deleted] are for [deleted]. Line 27—These [deleted] helicopters are the UH-1H series. [Deleted] are for [deleted] and [deleted] are for [deleted]. Line 32—[deleted] of these U-17B aircraft are for [deleted] and [deleted] are for [deleted]. Line 55—This \$2.0 million for modifications provides \$1.3 million for [deleted]. \$.1 million for [deleted] and \$.6 million for [deleted]. Line 60—Provision is included herein for aircraft spares and repair parts of \$10.8 million for [deleted], \$2.7 million for [deleted] and \$2.2 million for [deleted]. Line 61—Common Ground Equipment of \$3.4 million for [deleted] \$.3 million for [deleted] and \$.6 million for [deleted] is included in this line.

Classified Statement, p. 14-15: Re the proposed international fighter aircraft needed for air defense by such countries as South Vietnam, Thailand, Taiwan and South Korea, the statement says: "It will be relatively simple, inexpensive and competitive in the foreign sales market."

Question. Does the Defense Department intend to sell these planes to the above named countries, or as in the case of the F-5, will they be given to these countries through the Military Assistance Program?

Answer. Present planning envisions International Fighter Aircraft being given to the countries of South Vietnam and Thailand under the Military Assistance Service Funded (MASF) program and to the countries of South Korea and Taiwan under the Military Assistance Program.

Classified statement, p. 22: Regarding the request to procure 12 U-17B aircraft, the testimony says "five are needed as unit equipage for [deleted]. These aircraft will be utilized for forward air control (FAC) operations in Southeast Asia."

Question. Will these planes used for forward air control operations in [deleted] be flown by United States personnel?

Answer. Yes, they will be flown by United States personnel.

Classified Statement, p. 40: Re the missile category of "Other Support Equipment," the total request is \$664.6 million, of which [deleted] million is allocated to the "Defense Support Program" and [deleted] million to "Special Activities."

Question. Please supply more detail with respect to these two specific categories.

Answer. Classified details of these programs have been furnished separately to the committee.

COMMITTEE PROCEDURE

Senator McIntyre. Gentlemen, you have been very patient and I do appreciate your coming back here this afternoon, and don't be concerned that the Air Force seems to be getting much more treatment than some of the others. It just happened timewise that I could really sit down and really try to ask some of the smaller questions that we would like to know about. I just don't understand how we can ever understand them all but I do appreciate, Mr. Secretary, your

finances and your fine statement, General Glasser, and all the others who have participated.

Unless there are some final questions—

General Glasser. No, sir. We are very happy you took the time and in fact we would like to be of further assistance if we can in your preparing for any discussion on the floor or with any of your colleagues.

COMMITTEE RECESS

Senator McInter. Thank you very much, gentlemen. We will stand in recess until Tuesday at 10 a.m. (Whereupon, at 4:20 p.m., Friday, March 13, the committee was recessed, to reconvene at 10 a.m., Tuesday, March 17.)

MILITARY PROCUREMENT FOR FISCAL YEAR 1971

TUESDAY, MARCH 17, 1970

U.S. SENATE,
COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The Committee on Armed Services met at 10:10 a.m., in room 212, Old Senate Office Building, Hon. John Stennis (chairman) presiding. Present: Senators Stennis (chairman), Symington, Young of Ohio,

McIntyre, Smith of Maine, Murphy, and Goldwater.

On the staff of the Committee on Armed Services: T. Edward Braswell, Jr., chief of staff; and Labre R. Garcia, professional staff member.

On the staff of the Preparedness Investigating Subcommittee: James T. Kendall, chief counsel; Ben Gilleas, director of investigations; Ed Kenney, Don L. Lynch, David A. Littleton, and George Foster, professional staff members.

DEPARTMENT OF THE NAVY

PROCUREMENT BUDGET REQUEST

Chairman STENNIS. The committee will please come to order.

The committee today will receive the Navy and Marine Corps por-

tion of the annual military authorization request.

We are glad to have with us the Secretary of the Navy, the Honorable John H. Chafee; the Chief of Naval Operations, Adm. Thomas H. Moorer; and the Commandant of the Marine Corps, Gen. Leonard F.

Chapman, Jr.

For the record the Chair sets forth the following background information. Out of a total new obligational authority Defense budget request of \$71.2 billion for fiscal year 1971, the budget request for the Department of the Navy is \$21.7 billion. Of the fiscal year 1971 procurement authorization request totaling \$20.2 billion, the Navy portion totals \$8.2 billion with \$6.1 billion in the form of procurement and \$2.2 billion in the form of research, development, test, and engineering.

The breakdown of the \$6.1 billion for procurement is as follows: Aircraft, \$2.4 billion; missiles, \$1 billion; naval vessels, \$2.5 billion; combat tracked vehicles, \$48 million; other weapons, \$7.2 million.

We will continue the hearings with these gentlemen who are with us today who have a special welcome. Then we will proceed to complete the testimony with reference to all procurement items for aircraft, missiles, shipbuilding, and other weapons, and next we will take up then the research, development, test, and engineering portion of the Navy request.

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As we all know, we have a special obligation to make a survey with reference to the carrier. That won't preclude us from asking questions about the carrier today, and I am sure that you gentlemen will cover it.

Now, I want to mention a special matter for the information of the members and I think it is best for the time being we don't say anything about this until 12:30. The Army is going to make an announcement today at 12:30, members of the committee, about this My Lai matter, and General Peers' very exhaustive investigation of it. It is going to be a rather far-reaching matter, and is going to lead to more men having charges preferred against them, and presumably there will be proceedings by way of trial. I don't know how much of it can be released now.

I will have a brief statement here to make to the committee. I will have it prepared and finished by the time this announcement is made at 12:30, and I propose then to make that statement on the floor of the Senate. You will remember that we took jurisdiction of this matter last year. We had a briefing on it here and they have repeatedly reported to me its progress, not in detail, but the progress they are making in the investigation. I think the proper thing from a fairness standpoint, a judicial standpoint, and a committee standpoint is to let the Army proceed on these charges, whatever they may be, without us trying to have an investigation at the same time. When they finish, we will exercise our responsibility as a kind of an oversight committee in the legislative branch of the Government as to whether or not the Army has carried out its responsibility.

It is a serious matter and it is going to be far reaching in the

announcements and all that will come today.

All right. Now, back to the Navy. The main order of business here is our presentation from you gentlemen and we look forward to it. This is a very important part of the budget.

Mr. Secretary, you come before us. What is your pleasure now with

reference to your statement?

By all means all of it ought to go in the record but we will let you handle it. You indicated a minute ago you would like to put it in the record and then emphasize some of the high points.

STATEMENT OF HON. JOHN H. CHAFEE, SECRETARY OF THE NAVY; ACCOMPANIED BY ADM. THOMAS H. MOORER, CHIEF OF NAVAL OPERATIONS; AND GEN. LEONARD F. CHAPMAN, JR., U.S. MARINE CORPS, COMMANDANT OF THE MARINE CORPS

Secretary Chaffe. Yes, sir, Mr. Chairman. I would like to put it all in the record and then take about 7 or 8 minutes to emphasize some points I would like particularly to call to the attention of this committee.

Chairman Stennis. All right. That will suit us. We will then call on you, Admiral Moorer, for your statement and your presentation. Then General Chapman, and all of it will be out here on the table and we will be free to ask questions as we see fit.

All right, Mr. Secretary, you proceed, please. Secretary Chaffe. Yes, sir, Mr. Chairman.

Since my first report to this committee last year, it seems to me that

the role of the Navy and Marine Corps in their support of national

policy has become even greater.

Consistent with the views stated by the President in his foreign policy message to Congress on February 18, the U.S. role in world affairs is being significantly redefined. I am convinced, in the light of foreseeable political, budgetary, military, and technological developments, that our Nation must increasingly depend upon sea-based combatant and logistic forces for our defense against both conventional and strategic enemy forces as well as for support of our national objectives abroad.

Sea-basing of military forces is becoming more important to the United States as overseas base rights and overflight privileges diminish and become less certain. Naval forces are intrinsically well suited to serve as an instrument of U.S. foreign policy; they can demonstrate our determination, providing the degree of visibility desired, with maximum flexibility, yet with minimum overt commitment. Tactical air forces aboard attack carriers, combined with amphibious task forces, can operate freely in international waters, can be placed in areas of tension as conditions dictate, and can be used or withdrawn selectively. Historically, naval forces in areas of tension have been regarded as less provocative and committing than a deployment of land forces in equivalent strength. They do not require an initial construction phase in areas of operations, they do not leave behind expensive supporting complexes, and they can be used repeatedly. Mobile Navy/Marine sea-air-ground teams provide the capability of varied response ranging from a show of force to a forcible entry/reentry capability independent of ports, airfields, or extensive beaches.

With fewer total Armed Forces—and we are obviously coming to that situation—our Nation's forces must have greater mobility. Although there have been great strides in air transport, the bulk of supplies and equipment, petroleum, and troop reinforcements will continue to go by sea for the foreseeable future. At the same time that our seaborne mobility needs are increasing, we are concerned that the Soviet's growing nuclear submarine force will threaten that mobility. To counter this growing threat, a greater ASW effort will be required;

otherwise our mobility capability will not be credible.

Under the President's policy of "strategic sufficiency," our fleet ballistic missile submarines become even more important. Their survivability in the event of any enemy first-strike option exceeds that of any other strategic offensive system. The increasing threat to land-based strategic systems only reinforces the vital part that the POLARIS-POSEIDON submarine will play in insuring that the U.S.S.R. will continue to lack the incentive for a first strike.

Another factor significantly affecting the U.S. Navy/Marine Corps team has been the fiscal year 1970 and 1971 budget reductions. These reductions have been accommodated by reducing forces now with attendant risks in order to continue modest procurement programs to achieve modernization in the future. We plan to provide the finest in ships, aircraft, missiles, guns, and equipment that can be obtained with available funds. I think it would be interesting, Mr. Chairman, if we review briefly what has taken place in the past year in the Navy. To meet the fiscal 1970 expenditure reductions, the Navy has inactivated over 125 ships and reduced authorized personnel end strengths

by over 73,000 officers and men. The Marine Corps funding limitations were met primarily by a decreased commitment in South Vietnam and deactivation of the 5th Marine Division and other U.S. based units. The resultant Marine reduction is approximately 20,000 personnel.

For both services, Navy and Marine Corps, fiscal year 1971 reductions will total about 100,000 people. These are service people. Approximately 33,000 civilian positions are being eliminated from head-quarters staffs and shore installations within the Department of the Navy as part of the fiscal year 1970 defense expenditure reductions. A substantial portion of these reductions will be realized through the normal attrition process, the balance through reduction-in-force procedures.

In addition, in fiscal year 1971 we estimate we will reduce by about

30,000 more civilians.

We are making commensurate reductions in our shore facilities. Last fall we announced actions which involved 83 locations, equating to an annual savings of \$50 million. Of these, the majority were closed, the remaining were either consolidated or reduced in scope of operation. Other specific actions currently under consideration should yield additional savings. For instance, on March 6 we announced actions affecting 78 locations with an estimated annual savings of \$24 million.

Also, on a longer term basis, a worldwide review is being made of our bases and commands in order to determine the most efficient and economical base-support posture. This review is scheduled for com-

pletion this July, and should identify further savings.

Looking forward to the next few years, I see some key issues and problems for the Navy and Marine Corps.

VIETNAM

The first concerns the continuing assessment of the Vietnamization program as we continue our orderly redeployment of forces. As I have stated earlier, we are making good progress on this with the Vietnamese Navy and Marine Corps.

FUTURE OPERATIONS AND PROGRAMS

The second issue is that we still need to make some difficult decisions necessitated by reduced budgets and a continuing high level of commitments. It is clear to me that we will not be able to continue numerous, worldwide force deployments at present levels or to afford the variety of weapons that we have bought in the past. For weapon systems, the choice frequently will be a few of several complex types, or relatively more of a single, simpler type at a lesser cost.

Now, Mr. Chairman, we move to what I believe is the most single critical problem we face in the Navy: officer and enlisted retention.

Chairman Stennis. Call your page number.

Secretary Chafee. Yes, sir. That is on page 19, Mr. Chairman.

A third problem is that, regrettably, both the Navy and Marine Corps are still experiencing difficulty in obtaining and retaining high-quality, dedicated men in the numbers required to operate and maintain the increasingly complex, modern weapon systems. We are in far deeper trouble in this area than most people acknowledge. For example:

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Navy pilot retention dropped sharply from 60 percent in fiscal year 1966 to 31 percent in fiscal year 1969, with a further drop to 26 percent projected for this year. That was a drop in 4 years from 60 percent to 26 percent. At the same time, surface line-officer retention has remained at a critically low rate, fluctuating between 14 and 19 percent, with no improvement in sight. Our goal is more than double this latter level.

Nuclear submarine officer retention dropped from 75 percent in fiscal year 1966 to 59 percent in fiscal year 1969, with a further decline to 36 percent projected for fiscal year 1970. Following a special study of this situation, a number of retention incentives were developed, including the \$15,000 continuation pay program implemented last July. Preliminary reports of the results of this program are encouraging; the rate at which resignations are being received from these officers has decreased significantly. We now have assurance that sufficient numbers of officers will be retained to fill the minimum number of sea billet requirements in our nuclear submarines.

Navy enlisted retention at the first reenlistment point has declined from 24 to 16 percent over the past 4 years, with a projection of 13

percent for this year.

Although the Marine Corps is exploring all means within its control to influence and improve retention, there has been a decline in the percentage of eligible Reserve officers augmenting into the Regular Establishment—from 26 percent in fiscal year 1964 to 6.5 percent

in fiscal year 1969.

With respect to both Navy and Marine enlisted personnel, continued difficulty is being experienced in retaining the number of personnel required in certain long leadtime training and highly technical skills. During fiscal year 1969, however, the Marine Corps was successful in meeting the reenlistment goal of replacing each loss from the career force with a reenlistment from the first-term base. The results during the first half of fiscal year 1970 indicate a continuation of this success in the gross number of retentions. That, of course, applies only to the Marines.

Important prerequisites for successful retention programs include a basic military pay reform, improving the working environment of our people, and an easing of personnel turnover such as that created by

recent rapid force reductions that we have gone through.

I believe that there are a number of other areas which could be improved to increase retention of good personnel. For instance, we have long recognized the substandard condition of a large portion of personnel support facilities and, for the past several years, have placed significant emphasis on improving these facilities. One of our most critical deficiencies is in bachelor housing. The majority of this housing is old, overcrowded, and lacking in the basic elements of privacy. Over \$1 billion is required to provide adequate housing ashore for 21,000 officer and 207,00 enlisted personnel.

This applies to both Navy and Marine. This is a total figure. Almost three quarters of a billion dollars will be required to eliminate other personnel support deficiencies such as exist in schools for dependents, clubs, and chapels. It is my goal to provide modern, comfortable accommodations for every service man and woman at each of our permanent installations. Over one-fifth of our fiscal year 1971 Military

Construction budget request, \$70 million, is committed to the attain-

ment of this goal.

Another critical area of deep concern to me is the shortage of family housing. This shortage should be eliminated as soon as possible. The \$88 million being requested for Navy family housing would provide for construction of 3,500 housing units. The current deficit in the Navy family-housing program is almost 60,000 units. Increases in Department of Defense family housing helps also to alleviate the national housing problem.

I might say, Mr. Chairman, that, if the Congress approves the 3,500 units we have asked for this year, it will be the largest number of units Congress has given us since the end of the war, and, if I could put in a plea for any one item in this budget, it would be for the family housing—that you give us what we have requested. There are a lot of elements, as you know, that make up the retention problems, but cer-

tainly family housing is a key one.

Pay and less personnel turbulence are also important. But of the problems we can affect, we must do something about family housing. Chairman Stennis. All right. We will have some special questions

on that, Mr. Secretary.

Secretary Chaffe. Yes, sir. Now I will just finish this page.

Chairman STENNIS. Just as much as you want.

Secretary Chafee. The 1968 FHA family-housing survey included average monthly civilian-housing costs. The costs are for cities where Navy and Marine Corps personnel are stationed. It ranges from Jacksonville at \$149 a month up to here in Washington at \$213 a month. A married petty officer first class, E-6, for example, receives a housing allowance of only \$110.10 per month. This amount must be used to offset the above costs. On the other hand, the same amount would pay for his Government housing, including all utilities except for a telephone, if he should be one of the fortunate few to obtain family housing.

Now, admittedly, the geographic areas I have selected are generally above the national average but they are centers of Navy population and the figures do indicate what Government housing means to our people. The only way many of our married men can get by is to obtain a second job to supplement their military pay. That is particularly

true here in Washington.

Again I want to emphasize how essential your approval of all the requested funds for both bachelor and family housing will be in helping to retain the skilled people necessary for a top-notch Navy and

Marine Corps.

There is another area which I believe is of great importance also. I refer to the need for convincing our young Americans that service in the Nation's Armed Forces is indeed an honorable and worthwhile profession. If we could succeed in this regard, to a greater degree in these materialistic times than we have in the past, I feel certain that our personnel problems would be fewer and much more easily resolved. In this we earnestly seek all possible assistance and advice of the Congress.

That completes my statement, Mr. Chairman.

Chairman Stennis. Thank you, Mr. Secretary. We will place your statement in the record.

(The statement follows:)

Mr. Chairman, Gentlemen: Since my first report to this Committee last year, it seems to me that the role of the Navy and Marine Corps in their support of national policy has become even greater.

Over one-third of our active forces is at sea or overseas, while another onethird is available as a surge capability to augment on short notice those already deployed. Our naval forces are ready to deter nuclear agression, to defend the United States from attacks from seaward, to protect vital ocean shipping, to sustain our allies, and to protect our military power worldwide when and as required.

As of today, only about 29,500 Navy and 52,000 Marine Corps personnel remain in or based in South Vietnam. These numbers do not include such offshore naval forces as the Seventh Fleet. The Third Amphibious Force, consisting of the 1st Marine Division, 1st Marine Aircraft Wing, and support elements, is the major Marine combat unit remaining in Vietnam. In addition to their present combat roles, the Marines are achieving great success with the pacification program in the I Corps area. During 1969, the percentage of the population considered secure in the I Corps Tactical Zone increased from 69 to 93.

The role of Navy Seabees in the Vietnamization Program includes constructing naval bases for the Vietnamese Navy in the III and IV Corps areas as well as

training Vietnamese Navy personnel in construction trades.

It is anticipated that the Vietnamese Navy will assume almost all riverine combat operations by [deleted]. Because of a shortage of Vietnamese aviators, the turnover of helicopter/fixed-wing support for riverine combat units and offshore air patrol in support of coastal surveillance will take longer.

Turnover to the Vietnamese Navy of river and patrol craft is on schedule. Almost 260 boats and craft were provided to their Navy last year. Approximately [deleted] additional boats are programmed for transfer in the first six months

of 1970.

The South Vietnamese Navy is not yet able to support these operations logistically. We are working with them on this problem and hope to see them

logistically self-supporting [deleted].

The Vietnamese Navy is growing at a rate of about 1,000 volunteers per month and appears to have a high esprit de corps. New promotion systems and increased emphasis on qualification and training at middle management levels are improving leadership within both the Vietnamese Navy and Marine Corps. The Vietnamese Marine Corps will have expanded to a full division [deleted].

CHANGES AFFECTING THE NAVY AND MARINE CORPS

Changing roles

Consistent with the views stated by the President in his foreign policy message to Congress on 18 February, the United States role in world affairs is being significantly redefined. I am convinced, in the light of foreseeable political, budgetary, military, and technological developments, that our nation must increasingly depend upon sea-based combatant and logistic forces for our defense against both conventional and strategic enemy forces as well as for support of

our national objectives abroad.

Sea-basing of military forces is becoming more important to the United States as overseas base rights and overflight privileges diminish and become less certain. Naval forces are intrinsically well suited to serve as an instrument of U.S. foreign policy; they can demonstrate our determination, providing the degree of visibility desired, with maximum flexibility, yet with minimum overt commitment. Tactical air forces aboard attack carriers, combined with amphibious task forces, can operate freely in international waters, can be placed in areas of tension as conditions dictate, and can be used or withdrawn selectively. Historically, naval forces in areas of tension have been regarded as less provocative and committing than a deployment of land forces in equivalent strength. They do not require an initial construction phase in areas of operations, they do not leave behind expensive supporting complexes, and they can be used repeatedly. Mobile Navy/Marine sea-air-ground teams provide the capability of varied response ranging from a show of force to a forcible entry/reentry capability independent of ports, air fields, or extensive beaches.

With fewer total armed forces, our nation's forces must have greater mobility. Although there have been great strides in air transport, the bulk of supplies and equipment, petroleum, and troop reinforcements will continue to go by sea for the foreseeable future. At the same time that our seaborne mobility needs are increasing, we are concerned that the Soviet's growing nuclear submarine force will threaten that mobility. To counter this growing threat, a greater ASW effort will be required; otherwise our mobility capability will not be credible.

Under the President's policy of "strategic sufficiency", our fleet ballistic missile submarines become even more important. Their survivability in the event of an enemy first-strike option exceeds that of any other strategic offensive system. The increasing threat to land-based strategic systems only reinforces the vital part that the POLARIS/POSEIDON submarine will play in ensuring that the USSR

will continue to lack the incentive for a first strike.

Capabilities of the enemy

The increasing capabilities of our potential enemy are being loosely examined to ensure that our budget constraints, combined with a continuing heavy worldwide role, are not subjecting us to unwarranted risks. The most serious military threat facing the nation today is the continued rapid buildup of Soviet strategic nuclear forces. In addition, earlier estimates of the growing threat of Soviet forces to our supremacy at sea, and therefore the U.S. security, continue to be confirmed by the intelligence community. Soviet merchant, oceanographic research, intelligence, and fishing fleet modernization and operations continue to exceed U.S. efforts. Modern combatants are joining the Red Navy in large numbers; [deleted] submarines and [deleted] missile-configured surface ships were commissioned in 1969. In the past year, significant Soviet advances have been made in surface ship, submarine, and aircraft design; submarine and antisubmarine warfare; naval weaponry; and amphibious warfare capability. Their area of operations ever broadens. [Deleted.]

The Soviets are exploiting the capabilities of their seapower in ways short of war to expand their sphere of influence. Numerous Soviet initiatives, such as those in the Mediterranean and Indian Ocean, are resulting in significant gains to their power and prestige. In the two years ending last December, Soviet deployments outside home waters, in terms of ship days, [deleted.] The likelihood of conflict will depend upon the degree to which the U.S. and its allies maintain a military capability, backed by national resolve. We must provide both a credible deterrent and an effective flexible response throughout the spectrum of warfare.

Budget reductions

Another factor significantly affecting the U.S. Navy/Marine Corps team has been the FY 70 and 71 budget reductions. These reductions have been accommodated by reducing forces now with attendant risks in order to continue modest procurement programs to achieve modernization in the future. We plan to provide the finest in ships, aircraft, missiles, guns, and equipment that can be obtained with available funds.

To meet FY 70 expenditure reductions, the Navy has inactivated over 125 ships and reduced authorized personnel end strengths by over 73,000. The Marine Corps funding limitations were met primarily by a decreased commitment in South Vietnam and deactivation of the 5th Marine Division and other U.S.-based units,

a reduction of approximately 20,000 personnel.

Approximately 33,000 civilian positions are being eliminated from headquarters staffs and shore installations within the Department of the Navy as part of the FY 1970 defense expenditure reductions. A substantial portion of these reductions will be realized through the normal attrition process, the balance through reduction-in-force procedures.

We are making commensurate reductions in our shore facilities. Last fall we announced actions which involved 83 locations, equating to an annual savings of \$50 million. Of these, the majority were closed, the remaining were either consolidated or reduced in scope of operation. Other specific actions currently under consideration should yield additional savings. Also, on a longer-term basis, a worldwide review is being made at our basis and commands in order to determine the most efficient and economical base support posture. This review, scheduled for completion this July, should identify further savings.

FISCAL YEAR 1971 PROGRAM

Our plan for FY 1971, as reflected in the President's budget, provide for meeting the present essential missions of the Navy and Marine Corps and for continuing the acquisition of modern ships, aircraft, and weapons which we must have in the future. To modernize the Fleet, we need substantial shipbuilding and aircraft procurement programs for many years to come.

Looking at some of the specifics in the Navy and Marine Corps programs for

FY 1971:

For Strategic Forces, we will continue to operate and support 41 fleet ballistic missile submarines. Eight of these are now in shipyards being converted to carry the more effective POSEIDON missile. The conversions are being conducted con-

currently with nuclear recoring.

Our 15 attack carriers and one CVS being used as an attack carrier with their embarked air wings continue as a key element in projecting U.S. seapower. I am convinced that these attack carriers are required in FY 1971 in order for the Navy to carry out its assigned tasks in this "peacetime" environment. Admiral Moorer will discuss this in detail in his statement. The amphibious force, while reduced in numbers, will include over 95 ships, 57 of which are modern, 20-knot ships. This reduced force will provide a lift capability for four Marine Expeditionary Brigades.

Three ASW carriers, in addition to the CVS being used as an attack carrier, with air groups; eight missile cruisers; 30 missile frigates, of which two are nuclear-powered; about 200 destroyer types and ocean escorts; over 100 attack submarines, of which 52 are nuclear powered; and [deleted] P-3 land-based squadrons will be the principal elements of our antiair and antisubmarine defen-

sive forces.

With underway replenishment and other supporting ships, we plan to operate a total of about 760 active fleet ships by the end of FY 1971. This represents a reduction of 18 percent from the 932 ships at the end of FY 1968, which was the peak year of our Vietnam buildup; it is also less than the 880 ships at the end of FY 1965, before the Vietnam buildup.

The Navy and Marine Corps aircraft inventory will total about 8,260 at the end

of FY 1971 compared with 8,993 at the end of FY 1968.

Increased unit effectiveness of new and modernized ships and aircraft cannot entirely compensate for reduced numbers in the total fleet inventories. Therefore, our operating forces will be spread thinner in some areas. At the same time, we are experiencing the turmoil generated by the large "early-out" program, which is required to reduce personnel end-strengths to approved levels, and by the reassignment of personnel as a result of inactivations of ships and aircraft squadrons.

Marine Corps programs

The phased redeployment of Marine Forces from South Vietnam and proposed unit deactivations are on schedule. [Deleted.]

Marine Corps aviation programs are highlighted by the addition of the Harrier vertical/short takeoff or landing aircraft and the broadening of the helicopter mix. To compensate for these, the Marine Corps is giving up [deleted] F-4s for the Harrier, and [deleted] for UH-1N light helicopters and AH-1 armed helicopters. Other plans include resumption of the basing of Marine aircraft squadrons on attack carriers.

In addition to the items already mentioned, I would like to address a few of our efforts which support Navy and Marine Corps forces and programs.

Sea bec 8

With the completion of the major road network and other logistics support facilities in the I Corps in South Vietnam last year, Navy Mobile Construction Battalions (Seabees) in Vietnam were reduced [deleted].

Six 13-man Seabee Civic Action Teams are currently stationed in five islands of the Trust Territory of the Pacific Islands (TTPI) in response to a request made in June 1969 by the Micronesian people. By 1 January 1970, these units had completed construction of over 80 miles of road, four dispensaries, three vitally needed water catchments, and other miscellaneous projects. The teams' hospital corpsmen have treated over 1000 patients. In South Vietnam, 15 of these Seabee units have likewise continued their successful program this past year, as attested by strong local support for the program. In both Vietnam and the TTPI, the teams are conducting accelerated training in construction trades and civil work projects planning.

Sealift forces

The strategic importance of ocean transportation in a national emergency or wartime dictates that the United States must have under its control sufficient active cargo ships to meet the emergency sealift movement requirements of the Department of Defense. These movement requirements are met by augmenting MSTS-controlled sealift forces with ships from the active merchant marine. Depending upon the magnitude and duration of the emergency, further augmentation can be obtained from the National Defense Reserve Fleet (NDRF) and Inactive Ships in Naval Custody.

Current sealift assets, however, restrict the U.S. capability to respond rapidly and appropriately to a contingency involving military sealift. The active MSTS Government-owned fleet numbers 104 cargo ships and tankers (only four of which are under 25 years of age) and three passenger ships. Only 21 of these ships are deep draft cargo ships capable of contributing significantly to our needs. Furthermore, the remaining 130 NDRF dry cargo ships will be 30 years of age or over by 1978 when they are to be scrapped. Seventy percent of the U.S. Merchant Marine dry cargo fleet is of World War II vintage or older

Implementation of the President's maritime program is expected to be the most significant advance in the past twenty years toward the goal of improving our sealift posture both in peacetime and during national emergencies. The Navy and Marine Corps are solidly behind this program. However, for the immediate future, legislation is required which would authorize the Navy to charter ten multi-purpose ships and nine small tankers for an initial ten-year period. These ships are required for modernization of MSTS forces, which are rapidly approaching block obsolescence. The goal of this legislation would be to encourage private industry participation which the present five-year charter authority has failed to do.

Research and development

The growing sophistication of military operations and the increasing capabilities of the Soviets make increased technological progress a necessity for all the military services. The current reduction in the size of our forces clearly dictates that they be as modern and mission-capable as possible.

The Navy Research and Development program for FY 1971 has been planned to lead to the timely deployment of advanced equipments and weapon systems which will enable our Navy and Marine forces to carry out their mission in the face of any threat which might be imposed. The Assistant Secretary of the Navy for Research and Development will present this program in detail when he appears before this Committee.

Oceanography

While budget contstraints have limited the Naval Oceanographic Program and necessitated reductions in survey and oceanographic ship resources, the Navy continues to conduct almost half of the total Federal oceanographic effort. Two 300 gross ton oceanographic research ships are requested in the FY 1971 budget to replace obsolescent ships now engaged in Navy projects at academic institutions. \$210 million is requested in FY 1971 in support of Navy oceanographic programs.

Navy and Marine Corps Reserve Forces

At a time of adjustments in active force levels, a continuing assessment of Reserve requirements is necessary. Recent reviews indicate that it would be prudent for the Naval Reserve to remain at the current 129,000 drill-pay level in FY 1971.

The Naval Reserve has benefitted this past year from the assignment of 15 ships released from the active Fleet. These ships were placed in Naval Reserve Training status with more modern equipment than those they replaced.

The Marine Corps Reserve continues to improve its combat readiness. The reserve Division/Wing Team, the Fourth Marine Expeditionary Force, can be deployed to combat 60 days after mobilization.

Both Navy and Marine Air Reserve capabilities have been increased through the receipt of over 200 fighter, attack, and ASW aircraft from the active forces. However, attack and fighter aircraft are limited in some mission areas, no aerial refuelers are assigned, and ASW training is hampered by a shortage of test equipment to support the new aircraft. Further, there are deficiencies for Marine Reserve forces in helicopter lift capability.

As a result of FY 1970 expenditure limitations, 30 Navy and Marine Corps Reserve activities have been or are being disestablished. Every effort is being made to provide opportunities for Reservists by shifting functions and training. Regrettably, some units will have to relocate beyond reasonable commuting distance.

I desire now to address a few additional subjects which I feel will be of interest to you in your review of the Navy and Marine Corps budget request.

IMPROVEMENTS IN MANAGEMENT

Last year I discussed before this Committee certain improvements within the Department of the Navy in connection with weapon system acquisition. These included streamlining of project management procedures, the correct use of fixed-price-incentive instead of firm-fixed-price contracts, increased emphasis on performance specifications, and more realistic programming of Government-furnished equipment. Since then, additional procedures have been implemented:

In-house cost estimating capabilities have been strengthened to counter overoptimistic and unrealistic estimates, and more adequate cost management control

has been instituted.

Better definition, segregation, and management of those elements which entail "technical risks" are being accomplished. These procedures should preclude overoptimism in predicting when an item will be ready for successful production. Also, they should ensure the selection of the optimum type of contract to be employed commensurate with the risk involved.

To reduce the incidence of change orders, measures are being taken to ensure that major developmental problems have been resolved before initiating production. Further, more positive configuration management and control proce-

dures are being employed.

Increased use of milestone techniques in our contracts will provide timely identification of key progress check points and the funding implications associated with variations or delays in meeting these key points.

Special teams in the Naval Material Command have been established to provide

timely review and processing of contractor claims.

Greater uniformity of data and a greater degree of management analysis is expected to result from making management reporting systems consistent with Selected Acquisition Reports provided to the Congress.

In accordance with Congressional intent, procedures are being instituted to improve the management review of automatic data processing (ADP) operations for both the Navy and Marine Corps. At the Secretariat level, the senior ADP policy official is working closely with the Navy Comptroller to ensure that funding of computers and associated services is predicated on approval of systems development plans. At lower echelons, central design of major functional systems should significantly strengthen ADP management and operations.

SCN APPROPRIATION STATUS

Last year I reported to the committees of Congress that the Navy's ship-building program was faced with a large deficiency. During the course of my appearances, the deficiency was progressively updated to the range of \$800 to \$850 million. This cost growth resulted primarily from a continued succession of large claims submitted by our shipbuilding contractors. I also stated that there was a potential problem that could be as much as \$350 million more.

We have been analyzing the factors which resulted in claims, pinpointing areas where corrective actions are required, and instituting those corrective actions which I discussed earlier in my statement. These remedial measures, although not fully implemented in all cases, are to ensure a more positive con-

trol over our current programs.

I believe that we have identified the primary cause of our SCN appropriation cost growth and that our remedial actions will prove to be helpful with respect to current and future procurements. However, as our older programs progress to completion, additional financial increases—many associated with previous contractual commitments—are likely. In this latter case, we hope to identify such increases early in order to minimize them.

MAJOR PROBLEMS

Looking forward to the next few years, I see some key issues and problems for the Navy and Marine Corps.

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Vietnam

The first concerns the continuing assessment of the Vietnamization Program as we continue our orderly redeployment of forces. As I have stated earlier, we are making good progress on this with the Vietnamese Navy and Marine Corps.

Future operations and programs

The second issue is that we still need to make some difficult decisions necessitated by reduced budgets and a continuing high level of commitments. It is clear to me that we will not be able to continue numerous, worldwide force deployments at present levels or to afford the variety of weapons that we have bought in the past. For weapon systems, the choice frequently will be a few of several complex types, or relatively more of a single, simpler type at a lesser cost.

Officer/enlisted retention

A third problem is that, regrettably, both the Navy and Marine Corps are still experiencing difficulty in obtaining and retaining high quality, dedicated men in the numbers required to operate and maintain the increasingly complex, modern weapon systems. We are in far deeper trouble in this area than most people acknowledge. For example:

Navy pilot retention dropped sharply from 60 percent in FY 1966 to 31 percent in FY 1969, with a further drop to 26 percent projected for FY 1970. At the same time, surface line officer retention has remained at a critically low rate, fluctuating between 14 and 19 percent, with no improvement in sight. Our goal is more than double this latter level.

Nuclear submarine officer retention dropped from 75 percent in FY 1966 to 59 percent in FY 1969, with a further decline to 36 percent projected for FY 1970. Following a special study of this situation, a number of retention incentives were developed, including the \$15,000 continuation pay program implemented last July. Preliminary reports of the results of this program are encouraging; the rate at which resignations are being received from these officers has decreased significantly. We now have assurance that sufficient numbers of officers will be retained to fill the minimum number of sea billet requirements in our nuclear submarines.

Navy enlisted retention at the first reenlistment point has declined from 24 to 16 percent over the past four years with a projection of 13 percent for FY 1970.

Although the Marine Corps is exploring all means within its control to influence and improve retention, there has been a decline in the percentage of eligible reserve officers augmenting into the regular establishment—from 26 in FY 1964 to 6.5 in FY 1969.

With respect to both Navy and Marine enlisted personnel, continued difficulty is being experienced in retaining the number of personnel required in certain long-leadtime training and highly technical skills. During FY 1969, however, the Marine Corps was successful in meeting the reenlistment goal of replacing each loss from the career force with a reenlistment from the first-term base. The results during the first half of FY 1970 indicate a continuation of this success in the gross number of retentions.

Important prerequisites for successful retention programs include a basic military pay reform, improving the working environment of our people, and an easing of personnel turnover such as that created by recent rapid force reductions.

I believe that there are a number of other areas which could be improved to increase retention of good personnel. For instance, we have long recognized the substandard condition of a large portion of personnel support facilities and, for the past several years, have placed significant emphasis on improving these facilities. One of our most critical deficiencies is in bachelor housing. The majority of this housing is old, overcrowded, and lacking in the basic elements of privacy. Over one billion dollars is required to provide adequate housing ashore for 21,000 officer and 207,000 enlisted personnel. Almost three quarters of a billion dollars will be required to eliminate other personnel support deficiencies such as exist in schools for dependents, clubs, and chapels. It is my goal to provide, modern, comfortable accommodations for every service man and woman at each of our permanent installations. Over one-fifth of the Department of the Navy FY 1971 Military Construction budget request, \$70 million is committed to the attainment of this goal.

Another critical problem of deep concern to me is the shortage of family housing. This shortage should be eliminated as soon as possible. The \$88 million being requested for Navy family housing would provide for construction of 3500 housing units. The current deficit in the Navy Family Housing program is almost 60,000 units. Increases in Department of Defense Family Housing helps also to alleviate the national housing problem.

A 1968 FHA family housing survey included the following average monthly

civilian housing costs:

Jacksonville, Fla	\$149
San Diego	
San Francisco/Oakland	
Washington, D.C.	

A married petty officer first class, E-6, for example, receives a housing allowance of only \$110.10 per month. This amount must be used to offset the above costs. The same amount, on the other hand, would pay for the petty officer's Government housing, including all utilities except for a telephone, if he should be one of the fortunate few who obtains such housing. Admittedly, the geographic areas I have cited are above national norms for cost of living, but they are centers of Navy population and the figures do indicate what government housing means to our people. The only way that many of our married men can get by is to obtain a second job to supplement their military pay.

I want to emphasize how essential your approval of all the requested funds for both bachelor and family housing will be in helping to retain the skilled people

necessary for a top-notch Navy and Marine Corps.

There is another area which I believe is of great importance also. I refer to the need for convincing our young Americans that service in the Nation's armed forces is indeed an honorable and worthwhile profession. If we could succeed in this regard, to a greater degree in these materialistic times than we have in the past, I feel certain that our personnel problems would be fewer and much more easily resolved. In this we earnestly seek all possible assistance and advice of the Congress.

PREPARED STATEMENT

Chairman Stennis. All right, Mr. Secretary. That is a nice statement.

Admiral Moorer, we have already welcomed you and you proceed now with your statement. You wish to put it in the record?

Admiral Moorer. Yes, sir. I have a comprehensive statement I would

like to include in the record, Mr. Chairman.

Chairman STENNIS. All right. The reporter will put all of the Admiral's statement in the record and then take his testimony. All right, Admiral.

Admiral Moorer. Mr. Chairman, with your permission I would like at this time to highlight some of the key factors in my statement, using this viewgraph over here to establish the background upon which our budget was developed.

Chairman Stennis. All right. That will be helpful to us. You pro-

ceed in your own way.

Admiral Moorer. Before I get started I would like to also emphasize the point that Secretary Chafee made as to the reductions that have been imposed on the Navy during the recent budget cuts. They amount to a net reduction of 175 ships and 732 aircraft below the force levels which we had at the peak of the 1968 action in Vietnam, and for that matter, down to and below the so-called Eisenhower baseline forces in 1960. So we have had a very significant reduction in force levels.

Now, all of our defense forces, of course, are built up on the basis of the threat, and I would like first to discuss the growth of the Soviet Navy and show you how they have spread out throughout the world. This particular chart will give the exact locations, as we know

them in our intelligence centers, of the various types of ships. First, we have depicted here the location of the Soviet merchant ships.

As you know, the Soviets today have about 11 million tons of merchant ships. They have plans which will bring them up to a total of 23 million tons by 1980 and they are following these plans very closely. We have every reason to believe that they are going to achieve this. You see here that the majority of their ships are concentrated in the Atlantic and also up along the coast here in the western Pacific. There are 130 Soviet merchant ships here in the Mediterranean.

During the summer months they also travel here. About 6 percent of them go from Russia into the Pacific along what we call the North Sea routes coming down in here to Japan and Vietnam and places of that kind. This is only possible during a few months in the summer. But, in any event, this first chart does show the worldwide expansion of the Soviet merchant marine and the manner in which they are establishing a presence in all of the countries of the world.

For instance, ships that have been carrying supplies to Haiphong are stopping down at Australia, are picking up wool and taking it to Europe, and they are entering into all of the international commercial

competition on a worldwide basis.

Here you see their space support ships. These are deployed world-wide in the Indian Ocean, in the South and North Atlantic, and also in the Pacific. They give us a pretty good indication of the fact that they are about to commence a space experiment of some sort. When they position these ships, that is a tipoff that they are going to conduct some kind of space operation, but in any event, they use these ships worldwide for instrumentation purposes. Also they have the oceanographic ships which they deploy worldwide. They have one of the most modern oceanographic fleets in the world today.

They are not only studying the fisheries problem but also examining the contour of the ocean floor. All of these things have a bearing on the operation of nuclear-powered submarines, missile-firing submarines and things of that kind. They too are deployed worldwide.

Next, here we have the AGI's, the intelligence collectors. For some time now they have been maintaining one in the Tonkin Gulf, one off Guam, where the POLARIS submarines are, one off Charleston, one off of Holy Loch, one off Rota, and one in the Mediterranean. They relieve each other on station and maintain these positions on a con-

tinuing basis year in and year out.

Next, this shows their surface navy which is growing at a significant rate. Note particularly that there are 35 ships in the Mediterranean. They also operate in the northern Atlantic, some over here exiting from the Japanese Sea, and I think it is of interest to note several in the Indian Ocean where they have been operating for some time. I am confident that, when the Suez Canal is unbottled here, there will be a considerable amount of Soviet warship traffic through the Suez Canal from the Black Sea.

Next, and finally, we have the submarines. On an average the Soviets will have [deleted] submarines deployed worldwide every day. They will have generally about 12 in the Mediterranean. One of these is an [deleted] missile-firing submarine. Another usually is a nuclear-

powered submarine.

Of interest here is the fact that they have now begun deployments of the Yankee class, which is their POLARIS-type submarine. They are building these at a high rate of about [deleted]. Today they have [deleted] in the water. At the rate that they are currently building them, by 1974 they will have a force level equivalent to that of the United States.

Here I have listed from the latest intelligence some of the more significant advances that they are now making in their overall weap-onry. I have already described the *Yankee*-class submarine. Associated with that, they now have in development a [deleted] ballistic missile which will significantly enhance the capability of this submarine. They are building [deleted] new classes of nuclear- and diesel-powered

attack submarines. [Deleted.]

They are probably building a swing-wing medium jet bomber. They have [deleted] new or variant fighter-type aircraft. They have gone into production on the [deleted] Foxbat. They have deployed the Flagon A interceptor. They are improving all the time their strategic systems and, in particular, they have taken efforts to improve the big [deleted] missile as well as the [deleted] missile. They are also making considerable strides in ASW, including the two Moskva-class ASW ships.

Now, here I have listed the programs which you will find in our budget, Mr. Chairman. I have listed them according to functions: strategic deterrence, the striking forces, and antisubmarine warfare. I would like to point out that the purpose of all these forces is essen-

tially threefold.

First is to insure that the United States has the oceans available for herself and her allies.

Second is to prevent the opposition from using the oceans for their own benefit and bringing the war to the shores of the United States. And third, for projecting power from the sea to the shore as, for instance, is done with the POSEIDON missile system.

Now, in this budget we have the SSBN conversions. There are six in the current budget and eight are now in process. We expect to go

to sea with the first one in January of 1971.

You will note on the development side of the strategic deterrence force that we have the undersea long-range-missile system which is a system with an improved capability over POSEIDON, a much longer range. The idea here is simply to provide a wider area of operations for the submarines, thereby giving us a quicker response time and presenting the Soviets with essentially an unmanageable ASW

problem.

In the striking forces we have the \$152 million for the long lead-time funding for the CVAN-70 which you referred to a short time ago. We have four new types of aircraft here that operate from these carriers. We have one new guided-missile nuclear frigate. We have the anti-air-warfare conversions of the DLG-6 and DLG-12 class frigates. There are four in the current budget which will leave 5 still remaining out of a total of 19 ships. We have the new amphibious LHA and new aircraft for the Marine Corps, the A-4M's and the Harrier vertical takeoff aircraft which I am sure General Chapman will speak about later.

On the development side we have the F-14 with the PHOENIX missile with which you are familiar; the CONDOR standoff missile with the optical electronic guidance system; the AEGIS, which is an improved late model surface-to-air missile system for our ships; the missile defense systems which are a combination of several systems to defend against Soviet antiship missiles; and finally the HAR-POON, our antiship missile, which operates first from surface ships in a surface-to-surface mode and second, by taking off the booster, we can suspend it on the wing of an aircraft and use it as an antiship, air-borne missile.

Finally in the antisubmarine warfare category we have the new high-speed submarine, SSN-688, the new class of destroyers, the DD-963, which is really the first new destroyer we have built in many years; and the P-3C, which is the advanced anti-submarine-warfare aircraft.

In the development stage here so far as weapons are concerned, we have the MK-48 torpedo designed to operate against the Soviet nuclear-powered submarines. It has a speed of [deleted] knots as well as a significant depth, and we consider that this capability is a must if we are going to contend with the threats posed by the Soviet nuclear submarine.

And finally the S-3A aircraft which is the new ASW aircraft to replace the S-2. It will have essentially the same type of electronics that the P-3C does for purposes of analyzing and monitoring sensors of various types used in the detection of submarines.

That is a quick wrap-up of the major items in the program, Mr. Chairman. I would like to make a few other points here using this chart because, as you know, we are in a transition now, changing our

worldwide posture in general.

I would first like to make the point that there is no valid strategy today involving the use of our forces overseas that does not carry with it the assumption that we are going to maintain freedom of the seas and maintain the sealanes of communications open. As you know, in Vietnam now in excess of 95 percent of the supplies are carried by sea. When one gets into the heavy consumables such as bombs and food and things of that kind, I think that sea transport will be the pri-

mary means for many years to come.

Second, I would like to make the point that although we may concentrate on NATO, that in the case of the Navy, it is impossible for us to fight a one-ocean war. I call your attention to the fact that the Soviets are also in the Pacific where they have [deleted] major surface ships, [deleted] submarines, a large number of naval aircraft, and we have a State here in Alaska and a State here in Hawaii. Consequently, it means any time we get into conflict with the Soviet Union, we in the Navy will in fact be involved in a two-ocean war or perhaps greater because we do not have an option in this matter. The Soviets have the option as to whether they want to move toward the United States and attack our shipping in either ocean.

I would also like to point out that the sealanes today are not only threatened by submarines. They are threatened by surface-to-surface

missiles as well as air-launched missiles.

Consequently, I would simply emphasize from this chart that the Navy cannot fight a single-ocean war. Therefore as long as the Soviets

are involved with their large Naval force, which is growing all the

time, we would in turn be involved on a worldwide basis.

Finally, Mr. Chairman, I want to point out that in development of this budget we were in fact allocating shortages. In other words, we were preparing this budget under fiscal restraints and we have, I think, come out with the best balance that we could develop. I certainly fully recognize the competition that is going on today for Federal resources but at the same time I feel it is my duty as Chief of Naval Operations to emphasize to you and the committee that we are faced with a growing challenge at sea. It is out there for everyone to observe and consequently I believe that it is mandatory for the United States—if she is to continue to be a world leader and a maritime nation—to maintain a Navy sufficient to deal with this problem.

Thank you, Mr. Chairman.

Chairman Stennis. All right, Admiral. You have some very impressive facts there. Now, these slides that are not classified, I hope you furnish us with copies that can go in the printed record.

Admiral Moorer. We will be happy to do that, Mr. Chairman.

Chairman Stennis. And declassify as many as you can because I think Senators and staff members find them very interesting.

(The statement follows:)

Mr. Chairman and Members of the Committee, I welcome this opportunity to appear before you today in support of the Fiscal Year 1971 Navy budget requests. In my prepared remarks I will highlight the key factors which bear on the make-up of this budget and I will present certain perspectives for your consideration. Upon conclusion, I will be most pleased to enlarge upon these and such other matters as you may wish.

At the outset, let me set forth the force levels which this budget supports: included are 15 Attack Carriers; 4 Antisubmarine Warfare Carriers; 10 Guided Missile and Gun Cruisers; 234 Frigates, Destroyers and Ocean Escorts; 41 POLARIS/POSEIDON submarines; and 105 Attack Submarines (of which 52 are nuclear-powered). In addition, we have included amphibious forces sufficient to provide a lift capability for four Marine Expeditionary Brigades as well as the

necessary logistics support ships and miscellaneous craft.

May I call your attention to the fact that the Navy will end Fiscal Year 1971 with force levels that reflect a net reduction (i.e., total inactivations less acquisition of new and converted ships) of 175 active fleet ships and 732 active aircraft below the levels operated at the end of Fiscal Year 1968, the height of activity in Southeast Asia. Perhaps more striking is the fact that these force levels will be significantly lower than those of 1960, or what are often referred to in the press as the "EISENHOWER baseline-forces."

THE PROBLEM OF BALANCE

In developing this year's budget requests, one basic objective was sought by Secretary Chafee and me at every major decision point. That is, how best to maintain balance between modernization programs and forces in-being while giving full consideration to:

operational requirements and their demands on our human resources;

forces afloat and the supporting structure ashore; and

our various mission capabilities.

All of these factors are interrelated and each has its own immediate impact.

Modernization and forces in-being

This Committee is well aware of the basic problem the Navy faces with the encroaching obsolescence of much of the Fleet. This fact was well-documented last year by the House Armed Service Committee report on Seapower. Replacement of these worn-out ships and aircraft is expensive under today's market conditions, but cannot be delayed further if the Navy is to have the combat capabilities the country can rely upon in the future. In this regard, it must be noted that the increased expenditures of recent years necessitated by the conflict

in Vietnam have had relatively little constructive effect on the long-term modernization of the Navy. Some weapon sub-systems necessary to meet the environment of that unusual situation have been brought into being, but the bulk of the increased Navy expenditures were devoted primarily to sustaining combat operations—to buying for attrition; not modernization. Therefore, in an effort to correct this situation the Navy has found it necessary to introduce, on a compressed time scale, several new ship and aircraft programs that were repeatedly deferred during the mid-1960's.

Looking to the future, the Navy must also continue a substantial research and development investment. Only by a vigorous and imaginative assault on the bounds of technology can we ensure the soundness of our investment in ships, aircraft, and people. The Navy of the 1980's depends upon the research and development we do today.

An equal claim on the Navy's budget resources stems from the necessity to sustain and support our present deployment requirements at a tolerable tempo of operations as well as meet our initial wartime needs. In view of the extensive force level cuts which have taken place, we have fewer ships to do essentially the same job and our tempo of operations continues at a high rate.

With respect to Southeast Asia, Secretary Chafee has described the progress made and in prospect for turning over many of our in-country functions to the Vietnamese Navy. Offshore, the Navy is still very actively engaged, although it may prove possible in the future to progressively reduce the degree of close commitment of Seventh Fleet resources to Vietnam. In this regard, two offsetting factors must be appreciated. First, the increasing [deleted]. This has imposed an additional operational stress on deployed resources which will not be relieved until the naval force requirements in the Tonkin Gulf and South China Sea diminish. Secondly, the Naval and Marine forces in the Western Pacific, with their quick reaction capability, constitute an important reserve which must be kept at the ready [deleted].

In the Atlantic, Navy resources now available must be stretched thin in order to maintain the Sixth Fleet in the Mediterranean as well as a modest Middle East Force. For reasons I will touch on later, it is unlikely that these deployment requirements will diminish. For several years the Atlantic Fleet has been called on to provide a share of the naval force requirements in Southeast Asia, and, quite properly, the Navy has given first priority to those Pacific Fleet forces in actual combat. As a result, the Navy has been unable to maintain the modernity, readiness and overall capability of the Atlantic Fleet at the desired level. The Senate Preparedness Subcommittee report submitted in 1967 and other Congressional testimony clearly set forth the Atlantic Fleet problems which have continued to exist to the preesnt time.

Operational requirements and their demands on human resources

I believe it should be pointed out that the Navy met its peak force requirement in Southeast Asia and sustained its operations elsewhere throughout the world with only a relatively minor increase in total numbers of ships and aircraft. It was able to do so only by imposing an inordinately high tempo of operations on its forces in hand.

As I indicated earlier, the foreseeable requirements for overseas deployments in Fiscal Year 1971 have not diminished at the same pace as our extensive force reductions. Our tempo of operations will continue to be high—at least through the near term. In this regard, I must point out that even though not equal to modern equipment, our older ships and aircraft have combat capabilities that would be significant against older generations of adversary forces and have done well in taking their place in the rotation cycle. Therefore, their early retirement for budgetary reasons must be weighed carefully against the additional demands levied on our remaining forces.

An unrelieved, rigorous tempo of operations exacts its toll not only from our material assets but from the Navyman and his family.

Since World War II, assignment to sea duty has entailed a degree of family separation—both when routinely deployed overseas and when operating in home waters—which is uniquely high even among the military services. The recurring periods of tension, and most particularly the recent years of heavy naval force commitments in Southeast Asia, have added to the normal stress. The resulting impact on career motivation and our retention programs has become severe. What had been a deteriorating situation has been made worse by the personnel turbulence occasioned by the series of recent force level reductions.

For instance, during Fiscal Year 1970, about 230,000 men will be separated from the Navy.

It is urgent, therefore, that the tempo of operations be eased, sea duty made more attractive, and a greater degree of stability restored to our entire force structure. We must get on with our people-oriented programs—in training, advanced educational opportunities, housing, and numerous other areas—to reestablish a service environment attractive to the caliber of people on which the Navy's future ultimately depends. Unless we can do so, little progress will be possible toward the goal of a higher quality professional Navy.

Forces affoat and supporting structure ashore

If maximum combat capability is to be maintained within austere fiscal constraints, the reductions in our operating forces must be matched by a contraction of the Navy shore establishment and the release of large numbers of civilian employees. Certain steps have already been taken in this direction but it is evident that further measures will be required. To assist in future decisions in this regard, the Navy has instituted an intensive review of its entire base and support structure to identify all areas where economies could be effected and the management of resources allocated to support functions improved.

Mission capabilities

Interacting with all the other factors mentioned is the necessity to ensure that our current and future planning provide the internal balance of forces and capabilities required to perform the missions with which the Navy is charged.

The first of these missions is the contribution to the national strategic deterrent posture. This Committee is well aware of the role that our POLARIS/

POSEIDON force now plays in this regard.

The second is the maintenance of the full array of forces required to ensure control of the sea lines of communication to sustain overseas Allies and forward-deployed U.S. forces.

Third, the offensive power of our carrier strike and amphibious assault forces must be maintained at the levels required to meet the Navy's role in the national

strategy, both for credible deterrence and wartime application.

And finally, compatible support forces must be provided to sustain the mobility of forward-deployed naval combatant forces with minimum reliance on overseas bases.

Any budget-impelled reduction in our operating force structure entails difficult decisions and trade-offs in meeting these combined requirements.

NAVAL ASPECTS OF SOVIET MILITARY TRENDS

There is a key consideration which affects the budget requests before you—the character of the principal adversary with which the Navy must be able to cope now and at least into the foreseeable future.

Soviet maritime power

I have discussed previously before this Committee and elsewhere the continuing growth and pervasive spread of Soviet maritime power in its several aspects.

While we have been severely reducing our Navy, the Soviets continue a maritime expansion at a rapid rate. Another three-quarters of a million deadweight tons of new merchant shipping has been placed in the hands of the Soviet economic and political planners. The Soviet high-seas fishing fleet, the largest in the world, continues to grow and expand its operations in waters far distant from the homeland. And the Soviet Navy is extending its activities throughout the world, demonstrating growing confidence in its technical and operational competence while pursuing its missions with imagination, ingenuity and flexibility.

The United States is a maritime nation dependent upon the oceans for commerce, its own sustenance and the defense of our country worldwide. Nonetheless, we have skeptics who question the significance of the Soviet drive to attain seapower.

As just one example of what it could mean for the future, I believe careful consideration should be given to the changed situation in the Mediterranean.

During 1969, there was a 22 percent increase in the cumulative out-of-area "ship days" of Soviet naval operations. The Soviet squadron now normally

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comprises an average of 35-40 units, an increase of 5 over the 1968 level of 30-35. During most of September of last year, it was increased to a high of over sixty naval units. Along with the increase in the number of individual units, the Soviets have improved the combat capability of the force by enhancing significantly the command and control posture and by assigning newer and more effective ships. Their access to shore facilities in Egypt, and to a lesser extent Syria, has facilitated extended operations in the area. [Deleted.]

Although most assessments judge this Soviet naval presence to be motivated more by political and psychological considerations than by military factors, it has long been apparent that it has effectively reduced the military and political options available to the United States and its allies while providing

the Soviets options heretofore unavailable.

Moreover, the whole pattern of Soviet intrusion into the Mediterranean and the North African littoral has significant military undertones. The Soviets continue to make offers of military and economic aid in the area, and it must borne in mind that continuing economic and military programs permit large numbers of Soviet advisers to exert influence down to the lowest echelons. The Soviets continue their efforts to obtain use of additional shore facilities for their squadron in other Mediterranean countries. [deleted]. Further, we cannot rule out the possibility that Soviet [deleted] aircraft [deleted] might gain access to facilities in other areas [deleted]. The totality of these actions might well point to the steady build-up of a de facto infrastructure of logistic and operating air and naval bases throughout the Mediterranean that could support a rapid infusion of Soviet military power in any Middle East or NATO crisis as well as enhance their capabilities for operations in the Indian Ocean.

Others may be free to make their own judgments of Soviet intentions and discount the likelihood that they will capitalize on this changed situation. But as the Chief of Naval Operations and a member of the Joint Chiefs of Staff, I must direct my attention not to intentions but to capabilities and the courses of action which these very real capabilities make available to the Soviets.

Soviet military technology

For the same reasons, I believe we must look closely at the quite evident trends in Soviet military planning. Their investment of still scarce resources in modernization of their massive military structure is of particular significance and very impressive.

Consider for just a few moments what our intelligence analysis indicates for

the past year.

With a gross national product less than one-half ours, the Soviets have continued to fund military research and development at levels approximating those of the United States. The high priority training of engineers continued and there is every indication that the Soviet employment of scientists and engineers in military research and development will exceed that of the United States by a substantial margin in the decade of the seventies.

The Soviets appear to be developing, testing and deploying naval, air, and missile weapons systems which in variety and scope challenge the combined ef-

forts of virtually the entire free world.

The following discernible technological trends and observed new weapons sys-

tems are of particular significance to our own naval planning:

Continued construction and deployment of the POLARIS-type Yankeeclass submarine and associated SS-N-6 ballistic missile, [deleted] by 1974 it is estimated that the Soviets will have a ballistic missile submarine fleet equal to that of the United States;

Development of [deleted] new classes of attack submarines and continued

testing of underwater propulsion systems [deleted].

The entry into service of a second Moskva-class guided missile helicopter ship;

[Deleted].

Development of a new swing wing medium jet bomber;

Continued design, development, experimentation, and/or production of [deleted] new or variant type fighter aircraft including V/STOL and variable geometry types;

Series production of the [deleted] Foxbat interceptor, currently one of the world's highest performance fighters;

Deployment of the Flagon A Interceptor:



Progress in special programs related to solid propellants, multiple reentry vehicles, fractional orbit bombardment technology [deleted]; and

High priority efforts to improve the accuracy, survivability, and defense penetration capability of [deleted] intercontinental ballistic missile systems. This year-end evaluation was based on the most defailed and professional analytic efforts at our disposal; it constitutes hard intelligence—and not speculation.

The thrust and obviously sustained momentum of these Soviet technological efforts and their impressive achievements of the recent past establish the outer bounds toward which we must design our future U.S. Naval forces. To the extent that the Soviets continue to make their military equipments available to client states, the Navy must be prepared to cope with the same degree of sophisticated weaponry in a variety of lower order conflict situations throughout many important areas of the world.

FUTURE NAVY REQUIREMENTS

The final, and perhaps most basic, consideration influencing this year's budget requests relates to the missions the Navy must fulfill to provide for the future defense of the country.

Secretary Laird has discussed with you the national security policies which now form the basis for our military planning and the factors being considered in the allocation of resources to military preparedness. Within this framework, I would like to highlight the reliance that will be placed on the Navy to effectuate these policies.

Strategic deterrence

There is abundant and compelling evidence that the Soviets today are capable of inflicting unprecedented damage on the United States in any strategic nuclear exchange. New concepts which will convince the Soviets that they cannot gain a decisive military advantage through a nuclear first strike will insure deterrence and must be accorded priority consideration.

The mobility and concealment provided by sea-basing insures the overall survivability of our deterrent forces against a broad spectrum of enemy threats. In addition, sea-based forces can capitalize on the geographic asymmetries which exist between Russia and the United States. In planning for the future, it is increasingly apparent that these advantages of sea-basing must be fully utilized to maintain the deterrent posture necessary to counter the rapid build-up of Soviet strategic weapons.

With the increasing intercontinental and submarine-launched ballistic missile threat, POLARIS and POSEIDON constitute the most survivable components of our presently programed national deterrent force. By the mid-1970s this country will depend heavily on the POSEIDON with its multiple warheads for the Soviet ABM penetration capability that is vital to an adequate deterrent posture.

The proposed Undersea Long Range Missile System, or ULMS, would supplement our POLARIS and POSEIDON forces and continue towards the optimization of the nation's strategic offensive force mix. With its long range missile, the ULMS significantly increases the ocean areas available for operations and permits deployment around virtually the entire Soviet defense perimeter. This factor would reinforce our national deterrent posture in three highly significant ways; first, by insuring the survivability of a greater proportion of our second strike capability; second, by insuring that its sea-based component could not be degraded through an unforeseen breakthrough in Soviet antisubmarine warfare capability; and thirdly, by vastly complicating the antiballistic missile problem for the Soviets.

A sea-based ballistic missile defense system, or SABMIS, is also being investigated. Deployment of this system in the adjacent sea buffer areas would permit interception of intercontinental ballistic missiles before they reach the U.S. battle area and complement the SAFEGUARD system to provide a defense in depth. Two such systems on station could provide light defenses against ICBMs of the population, forces, and command centers located within the continental United States. Appropriately positioned, they could also provide intercept of submarine-launched ballistic missiles.

Strategic deterrence, therefore, will remain a major Navy mission in the future and one for which we must plan now.

Forward defense posture

The basic concept of deterrence also extends to conflict situations below the nuclear threshold and forward defense will continue to be the fundamental military policy for the defense of the United States and its interests.

However, several other policy changes have been initiated which will influence future planning of conventional force levels. As Secretary Laird has indicated, our allies will be expected to undertake an increasing effort in their own defense and there will be a trend toward a somewhat reduced U.S. forward defense posture with greater reliance being placed on a centralized strategic reserve to uphold our treaty obligations abroad.

As planning progresses in consonance with these trends, the characteristics of sea-based forces will assume even greater significance. Controlled visibility, mobility, self-sufficiency, limited reliance on foreign bases, selectivity in use—attributes that Naval and Marine Forces have demonstrated fully in the past—will come to be regarded as increasingly important dividends on defense investments.

The deterrence of aggression will continue to depend in large measure on the credibility of our forward defense posture and the obvious capability of the military forces that sustain it to prevail in wartime. Therefore, in looking to our future requirements, I believe it would be useful to consider briefly the major conflict scenarios envisaged in our military planning. The examination of naval roles in these situations will indicate the kind and quality of forces the Navy must provide to maintain a credible conventional deterrent.

Navy wartime roles

At the outset, I would like to emphasize that there is no valid military strategy for the engagement of any component of the armed forces of the United States in a major conflict overseas that does not carry with it the assumption that the Navy will maintain the sea lines of communication to the area of conflict. There is a practical limit to the amount of war material that can be prepositioned in probable theaters of operation or airlifted to reinforce during a crisis buildup. After the conflict crupts, the bulk of the men, material, and logistic support will have to come by sea. In this regard, three other points must be made.

First, any conflict with the Soviet Union is not just a European or Atlantic war for the Navy. The significant capabilities of the Soviet Pacific Fleet with its [deleted] submarines and its long range aircraft endanger Alaska, Hawaii, Guam, or allies further westward, and the vital sea lines of communication supporting them. A considerable degree of naval effort in the Pacific would be required.

Secondly, the security of our sea lines of communication in both oceans is jeopardized not only by the torpedo and cruise-missile equipped Soviet submarines but increasingly by surface units and long-range aircraft with standoff anti-ship missiles. Protective or covering forces for military or economic support shipping must have the requisite capabilities to counter the full range of opposing weapons systems.

Finally, control of the seas entails control of the airspace over the seas as well. Once combat begins, trans-Atlantic and trans-Pacific airlift routes could become vulnerable through the northern reaches of both oceans as well as in the approaches to the European and Asian landmasses. The same situation quite obviously prevails through the Mediterranean to the Middle East.

I make these points because all too many analyses and discussions have considered Navy roles only in relation to anti-submarine warfare and the support of land campaigns. [Deleted.]

Defense of NATO

Realistic planning for the defense of Western Europe against an attack by Warsaw Pact forces entails considerations other than the land and air battle on the Central Front.

First, control of the Mediterranean would have to be settled quickly in the Allies' favor or NATO could be outflanked to the south. Secondly, control of the exit from the Black Sea would have to be maintained and the isolation of Greece and Turkey prevented. And finally, the movement of men and material rapidly into Europe would have to be undertaken with minimum losses. These

objectives involve naval tasks of considerable magnitude in addition to those of rendering support to the land campaign—which could be critical to the defense in its early stages—and providing adequate protection in the Pacific.

Carrier strike forces would figure prominently in all these efforts from the very outset. They would need air superiority, attack, and electronic warfare aircraft able to punch through the extremely sophisticated defenses of the Pact areas. In turn, they would require the full range of capabilities necessary to counter the submarine, air, and surface ship weapons systems the Soviets could employ against them and the military convoys they would have to cover.

The initial anti-submarine campaign necessary to protect military convoys as well as naval combatant forces would be intense and demanding. Unless the Soviet submarine potential is reduced to manageable proportions during the early stages of conflict, the viability of any defense in Western Europe would be jeopardized once logistic support shipping became crucial. With the capabilities now being introduced in the latest classes of Soviet submarines, every element of our defense-in-depth forces—barrier submarines, patrol aircraft, ASW support carrier groups, escort ships, and passive surveillance systems—would be strained to the utmost.

Should assaults on the northern or southern flanks of NATO be required, major naval forces would have to be assembled to prepare, cover and support the landing of a Marine Expeditionary Force.

In short, any NATO war would entail the maximum utilization of every naval resource at our disposal and the outcome could be heavily dependent upon the initial results of our operations at sea in both the Atlantic and Pacific.

ASSISTANCE TO ASIAN ALLIES

For the foreseeable future and even though they provide the bulk of the manpower for their own defense and receive material and logistic support from the United States, our Asian allies would require varying degrees of supplementary military support to deter and meet the external aggression covered by our treaty obligations.

In most situations, this supplementary support would include tasks which sea-based forces can do extremely well. And in certain cases, additional tasks could devolve upon Naval and Marine Forces because their employment offers significant advantages.

In assisting our Asian allies to meet aggression at levels less than an overt attack by Communist China, Naval and Marine forces could be required to undertake offshore surveillance, patrol and blockade; naval gunfire support; flanking or interdictory amphibious or vertical assault operations; close air support; and local air supremacy operations. The fact that sea-based forces can sustain such operations from off-hore or very austere expeditionary bases ashore could dictate their choice in situations requiring a discriminating application of force or a carefully modulated involvement.

[Deleted.]

IMPLICATIONS FOR THE NAVY

From this very brief overview, I believe two conclusions are warranted. First, with the direction our national security policies are taking, this country in future will rely heavily on sea-based forces for deterrence at every level and for its forward defense.

Secondly, while there may be some question as to ultimate size, in view of the very modern Soviet Navy there can be no question as to the quality of the seabased forces the United States will require in the future.

FISCAL YEAR 1971 BUDGET REQUESTS

With the foregoing considerations as background, I would like to highlight certain aspects of the budget requests this year. In so doing, I will concentrate largely on hardware matters. This is not to imply the balance of the requests are any less vital; I merely wish to crystallize the efforts we are undertaking to ensure the Navy is capable of fulfilling the future missions I have described.

STRATEGIC DETERBENCE

To upgrade the present sea-based component of the strategic deterrence force, funding is being requested for the conversion of six more POLARIS submarines to carry POSEIDON, the long lead time items for continuation of the conversion

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program, and the procurement of missiles to support the planned schedule. With eight conversions funded through FY 1970 and in progress, this provides the next increment toward our ultimate goal of 31 POSEIDON submarines in step with the requirements for the regular overhaul and nuclear refueling of our present POLARIS force.

To date the development and testing of the POSEIDON missile is continuing on schedule with 11 of 16 flight tests having been successful, including a successful launch at sea from USS Obscrvation Island. I believe the development risk of proceeding is very low, and for the reasons discussed earlier, that we must maintain the fastest pace which prudence and good judgment will allow.

Research and development funding is also being requested to proceed with detailed design studies for the Undersea Long Range Missile System and to continue the investigation of the sea-based ballistic missile defense system.

STRIKE WARFARE

To provide the quality forces necessary for a credible forward defense, a number of major programs designed to modernize and improve the Navy's offensive capabilities would be continued in the year ahead.

The first is the long lead time funding for the construction of the third nuclear carrier of the Nimitz class, included in the President's Budget pending the results of the Congressional report required by the FY 1970 Authorization Act. It is very important to complete the 3-ship program as originally planned, and I am firmly convinced that we must proceed with this ship regardless of the attack carrier force level that may be decided upon in the future. This is a ship for the 1980s and on into the 21st century; it will be one of the cornerstones upon which we can build whatever maritime posture is then required.

The Nuclear Guided Missile Frigate program will be continued with the requests for full funding of the second ship and additional funding above that provided last year for long lead time items for the third and fourth ships. Maintenance of the program at this level is necessary not only for the capabilities which the ships themselves provide but to progress toward the goal of almuclear task forces which the Congress has advocated for several years. The benefits to be derived will be important to our future forward defense posture which is so heavily reliant upon mobility.

In our FY 1970 budget amendment, it was necessary to request deferral of two of the Guided Missile Frigate conversions. This year's request picks up these two ships along with two others to continue the 19 ship modernization program intended to counter the increasingly sophisticated Soviet aircraft and anti-ship missile systems.

The budget requests will also continue the development and procurement of the F-14/PHOENIX program, to meet an initial operational capability date of April 1973 for the first F-14A squadron and for the continued development of the advanced technology engine and avionics for the B and C models.

Development of the F-14 is proceeding according to schedule with no significant cost variations. The first aircraft is starting to take shape and today has an empty weight within 1% of the specification. The TF-30P-412 engine has been run in a full size F-14 inlet with no problems and sea level and static testing will be completed by fall. Full scale F-14 complete weapon system integration and testing will be underway at the Point Mugu Systems Integration Test Station and other systems—fuel, wing sweep, landing gear, slats and flap—will have been tested similarly using actual components prior to first flight, which is less than a year away.

The initial research and development firings of the PHOENIX have been completed with the outstanding success rate of 19 in 26. These were not only contractor demonstrations but thorough investigations of the potential operational capabilities of the missile. [Deleted.]

With the E-2C airborne early warning and command aircraft going into its fourth year of development, we are now requesting funding for limited procurement. The new radars and passive detection systems in this aircraft will introduce important new capabilities in tracking hostile aircraft over land and classifying both air and surface targets.

Procurement funding is also being requested to maintain a minimum production base of our other most important aircraft and missiles in order to introduce their increased capabilities at a modest rate. Here I must point out that our total aircraft buy in FY 1970 was the lowest since 1946 and will not replace

our operational and combat losses—to say nothing of those aircraft whose

service life will have expired.

Research and development funding requests will continue the urgently required program to counter anti-ship missiles. SHORTSTOP, the integrated surface electronic warfare system, is one major aspect of this effort. HARPOON, which is being developed as both an air launched anti-ship missile for patrol and attack aircraft and a surface-to-surface missile for ships of destroyer size to give us added offensive capability against the surface platforms carrying anti-ship missiles, is another.

ANTISUBMARINE WARFARE

The accelerated retirement of our older destroyers during the last two years and the termination of the ASW modernization of the DD-931/945 class increase the urgency of Fleet introduction of the 30 ships of the DD-963 program. Congress appropriated funds for the first increment of this program last year and we are requesting funds for six more this year. Although optimized for antisubmarine warfare, these ships are also effective in shore bombardment and other generalized destroyer missions.

Continuation of the SSN-688 program is required to maintain [deleted] capability against the latest classes of Soviet submarines. Although it is the Navy's objective to build [deleted] of these urgently needed ships each year, budgetary balance has restricted our full funding request to only 3 of these greatly improved submarines and long lead funding for another [deleted]. Accordingly, the five-ship sets of long lead items funded last year can be applied to support this year's building program and part of the presently planned FY 1972 program.

Introduction of the P-3C patrol aircraft, with its advanced avionics system, will be continued with funds requested for this year's buy of 12. While this is a lesser rate of modernization than we would wish, the backfit of the DIFAR sonobuoy system in the older A and B models will continue the improvement of our total weapon system capability against high performance submarines and help redress recent numerical drawdowns in the total land-based patrol force. It is important to note that these aircraft have major missions other than ASW per se; they provide the major portion of our capability to maintain surveillance of Soviet naval forces in their ever-expanding open ocean areas of operation.

The low-risk S-3A program will go forward to provide major increases in capability in those areas beyond the effective operational radii of our land-based patrol aircraft. The funds requested for research and development will meet our contractual obligations and provide related in-house support; those for procurement will provide two aircraft, both of which will ultimately be configured for fleet operations, to accelerate the complex flight testing program, and minimal funds for long lead materials to continue production of a small

number of aircraft in next year's program.

Elsewhere in the ASW area, other funding requests will continue research and development efforts to improve our sensor and weapon capabilities and procure new systems for backfit into existing platforms at a modest rate. The MK-48 torpedo, which provides a weapons capability commensurate with the other improved capabilities of our newest submarines, will be procured at the most practical rate with the funds requested until the competitive development and testing of this weapon can be completed and full production commenced.

AMPHIBIOUS ASSAULT AND MINE COUNTERMEASURES WARFARE

The modernization of our amphibious assault capability will be continued with this year's request for full funding of two LHA's and additional long lead funding.

Our mine countermeasures modernization program has had to be slowed both in FY 1970 and in this year's request which only provides for the conversion of 5 MSOs. As a consequence, there will be a [deleted] slippage in providing improved mine countermeasure support for our amphibious assault and other operations within the one hundred fathom curve.

SUPPORT SHIPS

Funds for the construction of major support ships were deferred from this year's requests. This resulted from competing budget needs of higher priority and, at least in part, the necessity to get a clearer picture of the future size of the

Navy's combat forces and their supporting base structure, at home and overseas. This was a reluctant deferral because we do not wish to add to the bow-wave of shipbuilding requirements we have pushed ahead of us for so many years. As soon as our plans become firm, we will again proceed with the modernization of this force upon which so much of our future mobility depends.

COMMUNICATIONS

In an era when we can anticipate a decline in the availability of overseas bases, it is important that we seek new ways to communicate rapidly and re-

liably with our naval forces throughout the world.

In the past year, the Navy, both unilaterally and in cooperation with the other Services, has made advances in our ability to quickly and effectively communicate with our forces in emergency situations. Improvements have been made in secure voice communications, in the handling of messages, and in the integration of operational intelligence information systems into command centers. Nevertheless, our future naval missions will demand an ever increasing capability for high speed, real-time inter-change of all types of information ranging from computer data to secure voice radio.

The most promising technique incorporates satellite communications to provide the capability for more effective command and control of our ships and aircraft while simultaneously allowing us to eliminate or reduce the operations

of many of our communications stations on foreign soil.

The FY 1971 budget requests funds to conduct the necessary research and developent of [deleted] a first step in the implementation of this program and for support of the Defense Satellite Communications System.

SEALIST.

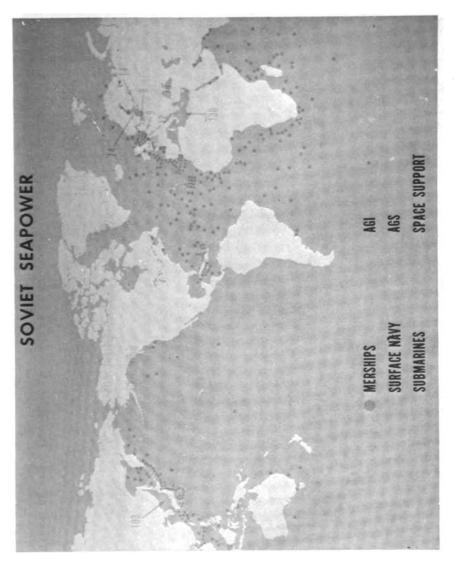
With our future defense policies so heavily reliant on mobility, it is vital that we begin to make substantial progress toward modernization of both our Navy and merchant marine scalift forces. I fully endorse and urge your early consideration of both the President's Merchant Marine Program and the legislation which would facilitate the MSTS build-and-charter program that Secretary Chafee has discussed.

SUMMARY

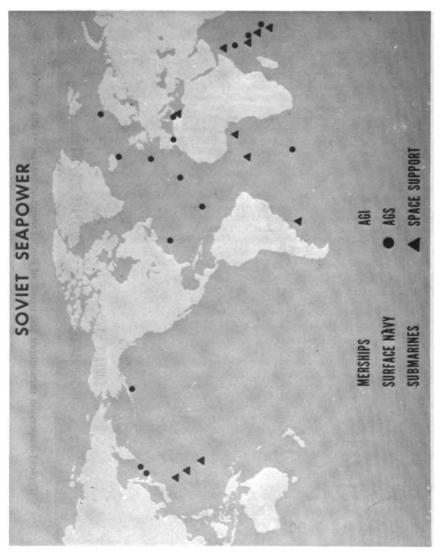
Mr. Chairman, I recognize and am fully conscious of the intense competition for resources in the Federal budget. Priorities must be established to meet requirements both at home and in the conduct of our affairs throughout the world. It is my duty, nonetheless, to emphasize as strongly as I can that we are faced with a challenge at sea that grows day by day and is inimical to our interests as a maritime nation. If the United States is to have a deterrence posture and adequate defense, it is essential to maintain a Navy capable of continuing its worldwide contribution to the forward defense of the country's interests. It must be of a size and quality that presents a credible deterrent obviously able to perform its wartime missions.

The budget requests before you have been developed carefully and reveiwed rigorously to ensure a balanced approach to that objective. Measured by any yardstick, this budget is a "barebones" budget. The requests contained herein are minimum and valid. I am prepared to justify them one by one.

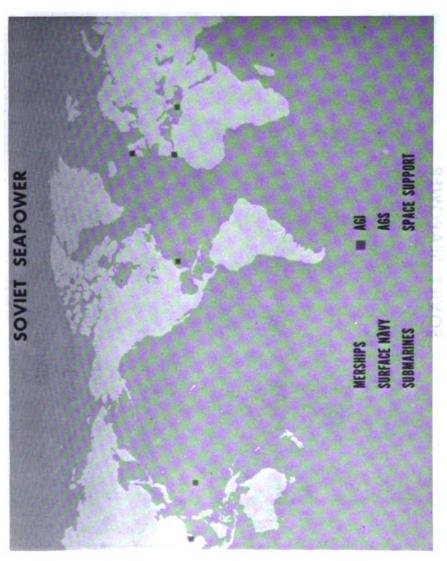
Thank you, Mr. Chairman.



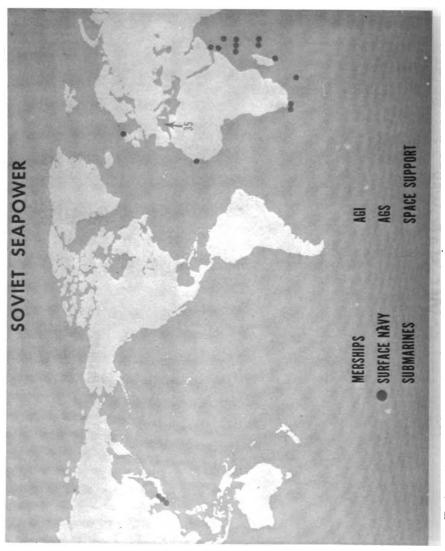
Typical dispersion throughout the world of Soviet merchant ships on any given day



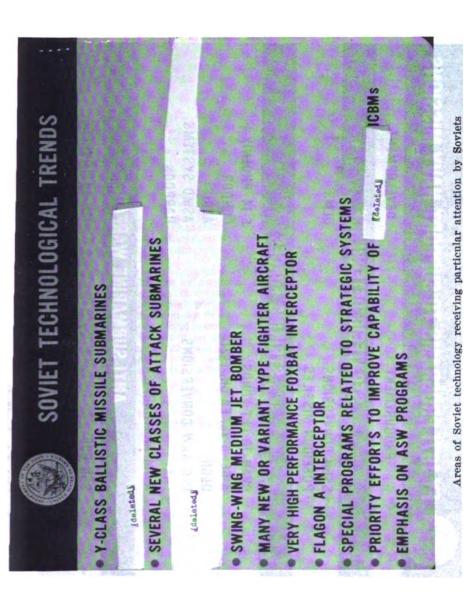
Typical dispersion throughout the world of Soviet oceanographic and space support ships on any given day



Typical dispersion throughout the world of Soviet intelligence ships on any given day



Typical dispersion throughout the world of Soviet surface navy vessels on any given day



FY 1971 PROGRAMS TO SUPPORT NAVY MISSIONS	DEVELOPMENT	TERRENCE	ULMS	ORCES	F-14/PHOENIX CONDOR AEGIS	ASMD SYSTEMS HARPOON	NE WARFARE	MK-48 TORPEDO S-3A
FY 1971 PROGRAMS TO S	PROCUREMENT	STRATEGIC DETERRENCE	SSBN CONVERSIONS POSEIDON MISSILES	STRIKING FORCES	CVAN-70 LLT FUNDS A-6E, A-7E, EA-6B, E-2C DLGN	DLG AAW CONVERSIONS LHA A-4M AND HARRIER	ANTI-SUBMARINE WARFARE	SSN-688 DD-963 P-3C

(See glossary of abbreviations on page 1255.)

Typical dispersion throughout the world of Soviet submarines on any given day (slide δ is classified).

GLOSSARY OF TERMS AND ABBREVIATIONS FOR FISCAL YEAR 1971

PROGRAMS TO SUPPORT NAVY MISSIONS

STRATEGIC DETERBENCE

SSBN: Nuclear powered ballistic missile submarine.

POSEIDON: Submarine carried ballistic missile; follow-on of POLARIS.

ULMS: Undersea Long-range Missile System.

STRIKING FORCES

CVAN-70: Attack aircraft carrier, nuclear powered Nimitz class.

LLT: Abbreviation for Long Lead Time.

A-6E: Advanced version of the land/carrier based all-weather attack aircraft.

A-7E: A land/carrier based subsonic, medium range light attack aircraft.

EA-6B: A four place derivation of the A-6 attack airplane capable of electronic surveillance and countermeasures.

E-2C: Carrier based early-warning aircraft capable of all-weather operation utilizing the latest radar and computer systems.

DLGN: Nuclear powered, guided missile frigate designed to operate offensively

against submarine, air, and surface threats.

DLG AAW Conversion: Conventionally powered guided missile destroyer, designed to operate offensively against submarine, air, and surface threats. Anti-Air Warfare (AAW) conversion updates the missile and computer systems carried.

LHA: A ship designed to transport and land troops and their essential combat equipment and supplies by means of embarked helicopters, amphibious craft

and amphibian vehicles, in amphibious assault.

A-4M: A Marine Corps high performance, visual, jet attack aircraft capable of delivering air attacks on sea or shore under visual weather conditions in support of seaborne or ground operations.

Harrier: High performance jet aircraft capable of vertical take off and land-

ing with heavy ordnance loads. Now designated A-8A.

F-14: An all-weather, carrier based jet fighter capable of performing air-to-air combat and air-to-surface attack missions. Capable of carrying PHOENIX missile.

PHOENIX: A long-range airborne missile system capable of destroying multiple targets in a heavy electronic countermeasure environment under all-weather conditions.

CONDOR: An air-to-surface missile designed to provide a stand-off delivery

capability of a large warhead very accurately.

AEGIS: A defensive surface-to-air missile system. It is planned as the major defensive system for the new guided missile ships scheduled to join the fleet in the mid-1970s.

ASMD Systems: Anti-Ship Missile Defense Program. Provides a coordinated and integrated program for improvement of fleet capability to counter the air-tosurface and the surface-to-surface anti-ship missile threat.

HARPOON: A surface-to-surface and air-to-surface missile. Follow-on missile in the ASMD system.

ANTISUBMARINE WARFARE

SSN: Nuclear powered attack submarine.

DD: Conventionally powered destroyer.

P-3C: Four engine high speed turbo-prop, land based, patrol aircraft designed for anti-submarine warfare. Contains latest most sophisticated electronic sensors.

MK-48: A sophisticated, high speed, homing torpedo for use in anti-surface and anti-submarine roles.

8-3A: A twin engine, turbo-fan, carrier based aircraft capable of operating in the 400 mph speed range and equipped with sophisticated submarine detecting equipment.

PREPARED STATEMENT

Chairman Stennis. General Chapman, as I said a minute ago to the Admiral, we have already given you a special welcome here. We

will be glad to hear from you now.

General Charman. Thank you, Mr. Chairman. I have prepared a detailed statement, as you know, sir. It is before you. The pertinent paragraphs which I have planned to read are outlined in black. However, with your permission I will highlight two or three things with regard to the Marine Corps.

Chairman Stennis. All right.

General Charman. The Marine Corps today consists of a total of three and a third active divisions and three active wings together with required combat support and service support units. The extra onethird of a division is on its way home now from Vietnam and will be deactivated after arrival. That will leave in Vietnam one division and one wing together with the logistic supporting troops; and that will decrease our strength in Vietnam from a high of 84,000 last year to about 42,000 at the completion of the withdrawal of the 26th Marines.

We will still have, however, some [deleted] infantry battalions and [deleted] aircraft squadrons continuously deployed outside the

United States.

Backing up the three active divisions and wings, then, will be a reserve division and wing, some 48,000 strong, which is in an excellent state of readiness, and is capable of deployment to combat 60 days after mobilization.

Among the withdrawals were the 3d Marine Division and associated 1st Marine Aircraft Wing units which have moved to Okinawa and Japan, a total of two-thirds of the division-wing team there

now, fully combat ready.

During fiscal year 1971 the budgets before you propose to reduce the size of the Marine Corps from some 294,000 to 241,000, which is an 18-percent reduction in the 12-month period. We will accomplish this in two ways: First, by reducing this month to our peacetime recruiting quotas; and second, by allowing many enlisted marines to voluntarily leave the corps well before their enlistments expire.

The reduction in our commitments in Vietnam and the reduction in the size of the Marine Corps, which is very welcome, will enable us to do a thorough housecleaning and squaring away and tightening up of the entire Marine Corps during this calendar year. We have already launched the programs to do that, so that we are shooting for a much harder and leaner and tighter and highly professional Marine Corps during the next 12 months or so.

The funds that are requested and the authorizations that are requested in the budget before you, Mr. Chairman, are entirely adequate to support the Marine Corps in carrying out the general plan that I have described, assuming that we will be able to reduce in size as I

proposed.

With regard to procurement, we are requesting authorization for several items that are very important to us. The first of these is our new amphibian tractor, the LVTP-7 the first buy of which was approved for us in the 1970 authorization and budget. We are requesting in this authorization the second buy.

Then there is the first buy of the Improved Hawk missile proposed in the 1971 budget, together with some minor other ordnance items.

Among the Navy programs are the second buy of the A-4M light attack aircraft that Admiral Moorer spoke to, some additional twin engine Hueys, and finally the Harrier, the vertical takeoff airplane which we now call the A-8A.

Last year we presented to the Congress our total program for the Harrier for [deleted]. That program is a total procurement of [deleted] Harriers, 12 of which were authorized in the 1970 budget.

The first aircraft will be delivered to us in [deleted]. We have Marine pilots flying the aircraft now in operational squadrons in the Royal Air Force. The Royal Air Force now has a squadron detachment of planes [deleted] on an operational training mission and they will deploy their first operational squadron [deleted]. So it is an operational airplane. It has some [deleted] missions logged already with about [deleted] flight hours. So it is a thoroughly tested operational airplane.

Its performance is remarkable, I think. It will lift the same ordnance as an A-4 vertically and carry it about [deleted] miles and loiter for [deleted]. In addition, with 600 feet of takeoff roll in the STOL mode, it will carry [deleted] pounds of ordnance [deleted] miles away and loiter for [deleted]. We think it is going to be an airplane of considerable importance. This year we are requesting authorization and funding for 18 more Harriers which will complete our first squadron of [deleted] and give us a start on our training detachment.

We are giving up [deleted] F-4 [deleted] in exchange for each Harrier [deleted].

I believe the committee is well versed in the unique capabilities of the Harrier, so I will say no more about it.

This is a summarization of the highlights of the Marine Corps situation, Mr. Chairman. In addition the Marine Corps is good and it will continue so under the proposed authorizations and budget.

Chairman Stennis. We will place your statement in the record.

(The statement follows:)

Mr. Chairman, members of the committee, this statement will consist of:

A resume of the significant events of the past year that have had the most profound effect on the Marine Corps,

A definition of the post-Vietnam objectives of the Marine Corps, and,

A brief discussion of fiscal year 1971 programs designed to contribute to the achievement of those objectives.

I want to emphasize at the outset, that the Marine Corps regard the coming year as a vitally important year of transition. By that I mean that the fiscal year 1971 programs must provide the flexibility for maintaining adequate forces to continue our strategic and tactical commitments in Vietnam and elsewhere, as well as simultaneously provide for scaling down our total force levels and moving toward the Marine Corps of the 1970's.

The war in Vietnam must rank first among those events of the past year which shaped our programs for the present and immediate future. The dimension of Marine Corps involvement in that conflict is illustrated by the fact that last year more than 125,000 Marines served in Vietnam. Further, with certain minor exclusions, since March, 1965, 97 percent of our assignable officers and over 97 percent of our career enlisted men have served one or more tours in the Western Pacific, either in Vietnam or in units in direct support of the war. Thus, we are moving toward a post-Vietnam Marine Corps with the highest level of combat experience in its history.

In so far as the war in Vietnam is concerned, I am confident that we are on the right course—that the plan for Vietnamizing the war will result in a resolution to that conflict under conditions which will make it possible for the people of the Republic of Vietnam to determine their own political destiny, free of external coercion.

Second only to the war itself has been the impact of the redeployments from

Vietnam.

Relocation of Marine Units from Vietnam to Okinawa, Japan, to form a Marine Expeditionary Force has significantly increased and improved the capability of (deleted) to respond to contingencies throughout the Pacific area, and equally important, has reestablished the Marine [deleted] element of that [deleted] at pre-Vietnam level. Naturally, this Marine force is ready to return to Vietnam if the need should arise.

Fleet Marine Forces at present include a total of 3 and ½ active Marine Divisions and three active Marine Aircraft Wings, together with the required combat support and combat service support units. Of these forces, [deleted] infantry battalions and [deleted] aircraft squadrons are presently deployed outside the United States from Southeast Asia eastward to the Mediterranean Sea

Backing up these active forces is a Marine Corps Reserve which includes a division-wing team together with the necessary supporting units. This reserve air-ground team, 48,000 strong, is capable of deployment to combat 60 days after mobilization.

The preponderance of our operating forces is assigned to Fleet Marine Forces Pacific. This command includes the III Marine Amphibious Force, now in Vietnam, which is comprised of the 1st Marine Division (Reinforced), the 1st Marine Aircraft Wing, a composite of supporting elements under the Force Logistic Command, and other appropriate combat support and combat service support units.

The I Marine Expeditionary Force at Okinawa, Japan consists of the 3d Marine Division less one regimental landing team, and elements of the 1st Marine Aircraft Wing. Concurrent with its commitment as the Marine Corps element of the [deleted] the I MEF also provides two Special Landing Forces to the U.S. Seventh Fleet. These rapid-response forces each consist of a battalion landing team and sufficient helicopter assets to provide vertical assault capability.

FMFPac forces in Hawali include the 1st Marine Brigade composed of a bat-

talion landing team and a Marine aircraft group.

West Coast forces include two battalions which make up the nucleus of the 5th Marine Expeditionary Brigade at Camp Pendleton, California; the 3d Marine Aircraft Wing at El Toro, California; and the combat support elements of Force Troops Pacific at 29 Palms, California.

The FMFPac units are committed to a variety of contingencies in the Pacific area, and in addition, are tasked to provide a Marine Expeditionary Force to

[deleted].

The major element of Fleet Marine Forces Atlantic, the II Marine Expeditionary Force, includes the 2d Marine Division and Force Troops Atlantic at Camp Lejeune, North Carolina, and the 2d Marine Alrcraft Wing at Cherry Point, North Carolina, an Beaufort, South Carolina. These units provide the reinforced infantry battalion committed to the defense of the United States Naval Base, Guantanamo Bay, Cuba, and the landing force of the Amphibious Ready Group Caribbean. Another Battalion Landing Team is deployed with the U.S. Sixth Fleet in the Mediterranean.

These commands are committed to the support of a myriad of contingency

plans ranging from [deleted].

Our goal continues to be the highest state of combat readiness possible for all our forces. In fulfillment of that goal, our forward deployed units are now fully combat ready. The remaining ground units are substantially ready and could be committed to combat operations almost immediately. Non-deployed aviation units, because of the complexity of their support requirements, would require additional time but could be made fully ready in sufficient time to meet present and planned requirements. It must be emphasized, however, that [deleted] some form of mobilization, as well as other emergency personnel actions.

So much for the brief overview of our forces today. Now what about the Marine

Corps in the post-Vietnam period?

We visualize Fiscal Year 1971 as a year characterized by lessened emphasis on Southeast Asia commitments, a rapid reduction in personnel strengths in con-

junction with an austere military budget—and yet, no diminution in our classic missions. Thus, our existing plans and programs are directed toward a hard, lean, fully combat ready and professional force, with emphasis upon expertly trained and highly motivated personnel. This is not wishful thinking; rather, it is the result of years of study and planning so as to be ready to return in the post-Vietnam years to a Marine Corps reduced in size but not in professionalism or combat proficiency. Our logistical thrust has been to plan for and ensure that the most modern and efficient equipment is available to give this force the greatest possible capacity. We want a compact, hard-hitting Marine Corps, capable of deploying rapidly and on very short notice by either sea or air. We want a force totally prepared for any mission ranging the entire spectrum from protection of U.S. life and property abroad, through crisis-control, to full combat commitment over a hostile coastline in helicopters or across the beach by boat or amphibian tractors—or a combination of both.

Further, our plans are aimed at improving the already effective Marine Corps Reserve, Organized, equipped, and trained in the image of the active forces, its mobilization capability will be sharpened to make it the ultimate in responsiveness.

The military manpower program which the FY 1971 budget supports, provides for a reduction from 294,000 to 241,000 Marines. This is an 18 per cent reduction in a 12-month period.

We will accomplish this reduction in two ways: First, by significantly lowering the numbers of new accessions—both officers and men; second, by allowing many enlisted Marines to voluntarily leave the Corps up to 12 months before their enlistments expire.

Certain effects of this decrease in strength will have an adverse impact on our units and on our individual Marines. Large scale early release programs will generate unusual turbulence and undesirable instability. Reduced strength will lessen the availability of promotions as compared to the past five years. Our manpower program is designed to soften the adverse impacts of this transitional period as much as possible.

Certain other effects of the reduction offer us opportunities to lay the ground work for our long-term goals. Fewer accessions, for example, will permit us to initiate greater quality control of our new recruits and, unless the recruiting climate changes radically, we should no longer have to use the draft. Further, we have initiated greater quality control of reenlistments. All of this will help us improve the professionalism of a smaller post-war force.

In sum, our transition manpower program is a balanced one. A greater reduction in strength would risk operational readiness while simultaneously increasing the adverse impacts on the career Marines to the point where our post-war goals of improved professionalism could be jeopardized. Conversely, however, a lesser reduction in strength is certainly not justifiable.

Our overall goal is to make the transition to a smaller force as economical as possible while still maintaining adequate combat readiness, as well as conditions of service that will not discourage selected officers and men from making the Marine Corps a career.

To ensure this high plane of military proficiency and professional pride in a smaller Marine Corps, we have increased emphasis on the traditionally excellent training which begins the day a Marine enters the Corps. Recruit training, reduced to eight weeks during the Vietnam war, has been expanded to nine weeks to provide a more thoroughly trained and indoctrinated Marine. Individual combat training, an intensive training program which follows recruit training and develops individual combat skills required for all Marines, regardless of duty assignment, has been increased from three to four weeks.

To further ensure the realization of our objective that every man in the FMF be a fully qualified Marine, those Marines who are to fill billets requiring special skills are assigned either to formal schools or to Basic Specialist Training upon completion of Individual Combat Training. We now have 23 Basic Specialist Training courses which provide such training for 62 per cent of all new Marines

Our emphasis on improved quality and professionalism is not directed solely at the recruit. All Marine training is receiving increased consideration. The feasibility of establishing formal Staff Noncommissioned Officer resident schools is being studied, and Basic School instruction for newly commissioned officers is being increased from 21 to 26 weeks. In addition, it will be our goal to provide every officer with the opportunity for continuing professional education progres-

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sively oriented toward career development at a time and level commensurate with his rank.

In this regard, a pilot program of Continuous Officer Professional Education (COPE) has been implemented with 15 officers participating at each of three East Coast commands. COPE is a restructured group study/correspondence course, utilizing programmed instruction and designed to provide a maximum number of officers with professional military education at the intermediate and high levels. When fully implemented, COPE is intended to be a supplement to, rather than a substitute for, attendance of active duty and reserve officers at resident schools.

The current logistical posture of the Marine Corps is good but requires continued improvement emphasis. Toward that end, adequate quantities of supplies and new equipment are being procured to ensure that our logistical posture is

responsive to our Force-in-Readiness role.

FY 71 plans envision optimum use of all redeployed assets. Units, when redeployed, have brought with them all supplies and equipment which are serviceable, economically reparable, and which, of course, are not required by other United States' units remaining in country or to assist in the Vietnamization program.

The equipment and supplies made available by deactivation of temporary units and reduction in the pipeline to RVN will serve as basic building blocks for the reconstitution of Prepositioned War Reserve Supplies (PWRS). Rehabilitation and/or repair of equipment from deactivated units is programmed and an eco-

nomical portion is included in this budget.

Progress is being made in the improvement of the readiness of Fleet Marine Forces by replacement of equipment that has completed its useful military life. During the past year, procurement commenced on the new family of assault amphibian vehicles, the LVTP-7 (formerly called the LVTPX-12). Contracts based on competitive bidding (fixed price incentive fee) will be awarded shortly. It is anticipated that deliveries will begin in June 1971 with the Fleet Marine Forces being fully equipped during FY 1974.

In a continuing effort to ensure that our anti-aircraft capabilities will keep pace with the capabilities of tactical aircraft, we are proposing an intitial buy of five battery sets and [deleted] missiles of the Improved HAWK system as a partial replacement for our present HAWK system. The first unit is scheduled to be

in operation by FY 1973.

Efforts are continuing toward improvement of management system. Only those essential ADP facilities needed to complete the Marine Corps wide program and ensure system compatibility and standardization will be proposed.

In aviation, as in ground programs, we have been continually looking ahead in an effort to provide the Corps with the most effective air arm for the least

cost.

We took an initial step in this direction two years ago when we made the decision to buy improved A-4 attack aircraft vice A-7's. The 1970 budget funded our first increment of this aircraft and the FY 1971 budget provides for the second increment, 24 A-4Ms. Procurement of these "M" models will permit us to replace aging models (some have been in service 13 years) with modern, more capable aircraft and at a very reasonable price for this day and age.

Also in this budget is a second increment of Harrier, the V/STOL aircraft which we requested for the first time last year. We are asking for 18 additional aircraft in order to complete one Fleet Marine Force combat squadron and provide a small training unit. The funds requested this year are greater than last year on a per aircraft basis as we plan to initiate production the United States

pursuant to the expressed desires of the Congress.

We need a V/STOL attack capability in order to improve versatility and flexibility on the battlefield. Harrier will increase our responsiveness to requests for close air support.

The third aircraft in this budget of direct concern to the Marine Corps is the UH-1N helicopter. Like the A-iM and Harrier, we seek second-increment pro-

curement this year.

If there is any lesson we learned in Vietnam it was that we needed many more light helicopters. We entered the Vietnam war with only 12 authorized per MEF. During the war we obtained authorization for 36 per MEF—24 light transports and 12 gunships.

The UH-1N, a twin engine helicopter procured by the Navy and the Air Force, as well as the Marine Corps, fills the light transport role superbly and can also

be used as a gunship by mounting machine guns in the doorframes on both sides and mounting rocket pods or fixed forward firing machine guns on the sides.

In order to sustain our current approved force levels of light helicopters, we agreed to give up one F-4 squadron, one group air base squadron and one group headquarters and maintenance squadron. In addition, in order to get Harrier, we offered up another F-4 squadron. Consequently, our Force level of these fighter attack squadrons will be reduced to [deleted] by the end of FY 1971.

The FY 1971 budget requests a total of approximately \$2.105 billion of new

obligation authority for all Marine Corps Appropriations.

This amount will adequately support the Marine Forces in Vietnam, plus the Fleet Marine Forces and base line support forces in CONUS, and other parts of the world.

In summary, the past year, I think, has been one of greatness for the Corps. The leadership and devotion exhibited by Marines the world over are a source of great pride to me and to all Marines. In Vietnam, often fighting under the most adverse conditions of terrain and climate, these Marines and their brothers in arms from all U.S. services and the forces of our Free World Allies, have acquitted themselves with honor and distinction. In addition, the professionalism and finesse with which the redeployments from Vietnam were accomplished reflects the greatest credit upon them.

This kind of devotion and courage has made the Marine Corps truly the Nation's Force in Readiness, and I assure you that we will continue to honor the great trust which our Country and this Congress has placed with us. It is a great privilege for me to represent the Marine Corps before you today.

Mr. Chairman, this completes my statement. I will be pleased to attempt to

answer any questions the Committee might have.

MATERIEL RECLAMATION

Chairman Stennis. All right, General. Thank you very much. I call the Marine Corps Mr. Frugality. It seems to me like you do a lot with what you get. That is what they said about General Forrest, you know. He did the most with what he had.

General Charman. I would like to say in that connection—

Chairman STENNIS. That is not an unfavorable comparison with any of the others. You don't have the overhead that they have, but I am still most impressed with the way you spend your money.

General Chapman. I was just going to say in that connection that we are coming out of Vietnam with everything that will be useful or

that can be made useful.

Chairman STENNIS. You are going to bring it home, you mean, and use it.

General Chapman. We are going to bring it home and use it; yes, sir. I was over there in January and I found out we were using a \$50 cutoff. So right on the spot I changed it to \$5. I want the committee to know we are going to bring home any U.S. Marine Corps property that is worth \$5 or more that isn't needed in the country, and we will put it on the shelf and have it available for the future.

Chairman Stennis. Well, that sounds old-timey now to a lot of people, but that is what I was reared on. I still believe it is right.

I want to make an observation here, gentlemen, and this is not critical of anyone personally. I want the staff members to hear this, too. Assistant Secretary of the Army, Mr. Fox, has sent me a recent publication of his, "Defense and Aerospace Glossary for Project Management." It took him 280-odd pages to list all the abbreviations that you gentlemen in the military and space have for your weapons, for your different groups. I don't say that critically but I think that explains why it is hard sometimes for you to get your message over to

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the public. A man who has to run and read and make a living, he skips a lot of your information because he doesn't catch it, and I am the one

that has to skip some of it.

Be careful to spell out what you are talking to me about because it is too late for me to start learning a new language. Our friend from Arizona and our friend from Missouri are versed in a lot of these weapons and abbreviations but I really think from the standpoint of your public relations, releases and all you give, charts you make, that there is just a lot of it that the public doesn't get at all. And I believe that with a little effort you could revise this and carry the message a whole lot better.

I emphasize I don't say those things critically but it is something that all of us to a degree have to struggle with, getting down to the

real meaning.

Gentlemen, at the pleasure of the committee, we will follow the usual rule here of 10 minutes for questions, not just strictly enforced as to the 10, and we will sit until 12:30 and then resume at 2:30.

REDUCTION GUIDELINES

I want to go back now to your statement, Mr. Secretary, on page 7. You were talking about these worldwide reductions that you made.

What were your main guidelines? I think I approve of them generally. I am not complaining. But reductions here in staff, head-quarters staff, shore installations, also bases, naval setups of one kind and another, and civilian employees, and so forth, what were your

main guidelines as you struggled with that matter?

Secretary Chaffel. Our main guidelines, Mr. Chairman, were to keep a proper balance within the Navy and we had to make fairly rapid reductions last year in view of what seemed to be the temper of Congress. As you recall, the 1970 budget wasn't approved by Congress until very late; yet we had an inkling of what was going to happen. Therefore, we had to make these reductions pretty rapidly. In order to make reductions rapidly, the only way to do this is with manpower—our officers and enlisted, our service people, and civilians—and in ships. In starting with the ships, we took the oldest ones, or the ones we thought were of least value to us, and took them out of the active fleet. We then reduced personnel by an amount about equal to the crews of these ships. Because we didn't desire to end up with a disproportionate number of personnel ashore as compared with those at sea, we had to cut down on our base structure, thus maintaining a balance in our forces. These were our guiding criteria.

Also, we saw that there wasn't going to be enough money for, for instance, the number of overhauls that we wanted, thus reducing the requirements on our shipyards to cut back on personnel in our ship-

yards because of a decreased workload.

Chairman Stennis. You cut down on your overhauls, you say?

Secretary Chaffee. Yes, sir. We had to because of money problems. Chairman Stennis. You are certain that you didn't affect the bone

and muscle of the Navy in carrying out its mission?

Secretary Charge. That is always a tough question, Mr. Chairman. We think thus far that we are all right, that we have not seriously weakened the Navy. Now, of course, we can't do as well as we could

do before we had the cuts. But in an overall appraisal, I believe we can still carry on our mission. We certainly would hate to cut any more.

Chairman Stennis. Well, I think you should have gone through this thing and cut down wherever you could, consistent with strength. Everybody knows Secretary Laird is somewhat of a favorite here on the Hill, especially those of us who have worked with him. I noticed last year, though, the Department of Defense made the reductions but when he commenced discharging all these civilians, he said Congress was responsible because they didn't leave enough money.

Now—

Secretary Charge. I will stay out of that one, Mr. Chairman.

Chairman Stennis. I think we are both guilty to a degree of cutting down on these funds, and sometimes it is well justified. Doubtless there are some places we might have made some error.

Now, back here to page 5-

Secretary Chafee. Mr. Chairman, one point I would like to make to give you an indication of what we have done. At the end of fiscal year 1971, in other words, with respect to the budget now before you, we will have 102 fewer ships than we had before Vietnam. In other words, if you take 1964 as pre-Vietnam, we will have 102 fewer ships. We will have 25,000 fewer men than we had pre-Vietnam. So we are really getting awfully low.

Chairman Stennis. Well, I think you are entitled to some new ships in place of some of those old ones. As long as we don't give you new

ones, you don't like to give up the old ones even.

EXTENSION OF RUSSIAN NAVAL ACTIVITIES IN PACIFIC

Now, back on page 5, Mr. Secretary, you are talking about this Indian Ocean matter and the Soviets. It says "numerous Soviet initiatives such as those in the Mediterranean and Indian Ocean are resulting in significant gains to their power and prestige."

What significant initiating actions do they have in the Pacific Ocean

to which you refer? Be fairly brief on that if you can.

Secretary Chaffe. The Soviets have made visits all up and down the east coast of Africa. You may have seen in the papers this morning that Singapore apparently is going to let them use their dock facilities. They have made extensive visits to India and Ceylon. They have a presence there whereas our total presence in the Indian Ocean is really restricted primarily to transits, and to a very small force in the Persian Gulf, consisting of a couple of destroyers and a converted seaplane tender.

Admiral Moorer. In early 1968 they had three warships and a tanker that visited 10 ports in eight countries, and since that time they have maintained at least one warship in the Indian Ocean on a continuing

basis.

These ships have been coming primarily from the Pacific fleet in the Vladivostok area, but as I mentioned in my presentation, I am confident that as soon as the Suez Canal is open they will also come in from the Mediterranean and the Black Sea, sir.

PRE-VIETNAM VERSUS PRESENT VIETNAM WAR NAVAL STRENGTH

Chairman Stennis. Well, we will get into that more later.

One overall question here for reference in debates. In terms of ships and personnel—and that includes both military and civilian—how does the Navy for fiscal year 1971 compare with the Navy for fiscal year 1964, before the Vietnam buildup?

If you are not prepared to answer that right off, you can supply

that, Mr. Secretary.

Secretary Chaffee. Yes. I will give you just the statistics. We will have 102 fewer ships——

Chairman Stennis. Was that tied to the comparison of 1964?

Secretary Chaffe. Yes, sir. That was 1964.

Chairman Stennis. All right.

Secretary Charge. The overall answer: The Navy will be smaller. Admiral Moorer. We will correct that for the record and give you the full story in the record, Mr. Chairman.

Chairman STENNIS. Yes. (The information follows:)

	End, fiscal y	ear—
	1964	1971
Ships in the active fleet Navy military personnel Civilian personnel (less Marine Corps)	859 1 667, 596 318, 316	757 1 643, 840 345, 203

¹ Includes reimbursables.

PERSONNEL BUDGET LEVEL

Chairman Stennis. Now, the Air Force testified that, in the case of their 1971 budget, about 60 percent of the amount was for personnel and O. & M. support. Is that about the percentage that you would apply to yours?

Secretary CHAFEE. I will have to work that out.

Chairman Stennis. All right, Give us an answer to that for the record which will show what percent now of your budget for 1971 goes to personnel.

Secretary Chaffe. It is not that high, Mr. Chairman. It amounts to—Personnel, and Operation and maintenance, total \$11 million, out of a \$21 billion budget—\$11 billion. Total: that is 52 percent.

Admiral Moorer. That is 8 percent less than the Air Force.

Chairman Stennis. Well, we want to get that and be able to state it on the floor. I think, when you add all four services up, it runs right close to 60 percent. It did last year.

Secretary Charge. With the Army I think it would probably be a higher percentage whereas with the Navy it would be less than 60 percent.

(The information follows:)

Note: Number of end-year personnel figures for fiscal years 1964 and 1971 are not directly comparable. During this period the DOD civilian substitution program resulted in a reduction of about 30,000 Navy military numbers and an increase of about 23,000 civilian authorizations to replace them. In addition, almost 6,000 Navy contract engineering technical service iobs were converted to civil service.

PERCENTAGE BREAKOUT OF DEPARTMENT OF THE NAVY BUDGET

	Fis		
Navy and USMC	1969	1970	1971
Operations	55	53	52
PersonnelO. & M. funding	28 27	29 24	28 24
Procurement RD.T. & E.	35 10	37 10	38 10

PROGRAM FOR VIETNAM NAVY

Chairman Stennis. Well, my time is up. Maybe there is time for a short discussion by you. I see you talk about building up the Navy of South Vietnam, being relieved of your activities there, and all. That is hard for me to visualize very clearly.

When do you expect to be relieved of your duties in Vietnam and

turn it over to them?

Secretary Chaffe. We expect to be relieved of our patrols on the rivers there by [deleted] only [deleted] from now. However, we won't be completely through by then because we still will have people there helping the South Vietnamese Navy with maintenance and logistics matters such as handling supplies.

Of course, I just don't know how long we will continue to help them. I suppose we will assist them for a considerable time. But as far as physically having our people there, I would expect that we would be out—have our maintenance and logistic people out by [deleted].

(The information follows:)

If a Military Assistance Advisory Group force is established to operate in the Republic of Vietnam beyond this date, it is evisioned that the U.S. Navy will participate in this Military Assistance Advisory Group in support of the Vietnamese Navy.

Chairman Stennis. You mean those that are in there on the ground? Secretary Chaffel I am just talking Navy now.

Chairman Stennis. You are not expecting them to have a naval air

power, for instance, that would be a substitute for yours?

Secretary Chafee. That is a more difficult problem. I am talking just in country as concerns the riverine operations, not what comes from the 7th Fleet. As far as having the helicopters and the OV-10's, for instance, to help the riverine operations, that is a problem right now because the Vietnamese Air Force has so many requirements. We don't know when they will be prepared to take over, as a dedicated force, the tasks now being performed by Navy helicopters and OV-10's.

Chairman Stennis. Well, I just don't see how you are going to man-

age it.

Admiral Moorer. If I may add just a bit. Currently there are 31,000 men in the South Vietnamese Navy; the projection is for [deleted]. We expect to transfer all of the combat river-type craft to them by [deleted]. Ultimately they will have [deleted] ships transferred to them, most of which are just craft that ply the rivers, but we are going to transfer to them—at least the plan calls for transfer to them—[deleted] oceangoing ships, [deleted] type cutters, and two destroyer

escorts. Of course, these destroyer escorts are subject to approval of the Congress in the ship-loan legislation. The plan would be for one destroyer escort to be transferred [deleted]. I believe.

Chairman Stennis. You said [deleted] oceangoing ships, two de-

stroyer escorts and then you named some smaller group before—

Admiral Moorer. Yes. I said two destroyer escorts and [deleted]. And they would be used in the anti-infiltration patrols off of the coast of Vietnam.

Chairman Stennis. And then you had those small ones for the canals and rivers.

Admiral Moorer. Yes, sir. And then there are, of course, supporttype craft. There is quite a combination. As a matter of fact, about 20 different types, Mr. Chairman.

Chairman Stennis. Well, if you will look that over, please, and see

what else needs to be supplied. We won't dwell on it any longer.

(The information follows:)

VIETNAMIZATION—U.S. NAVY TURNOVER OF SHIPS/CRAFT/BOATS TO VIETNAMESE NAVY UNDER THE ACCELERATED TURNOVER (ACTOV) PROGRAM

Туре	Number to be turned over	Number completed	Number remaining
Landing craft repair ship (ARL)	}(Deleted)		
Compat salvage parge (CSB)),,		,
Destroyer escort (DE)1	2		•
Landing craft, inechanized (LCM-5))	l	
Landing craft, utility (LCU)	1	ł	
Tank landing ship (LST)	1	ł	
Itility hast (100'IIR)	``	1	
Utility boat (100'UB) River patrol boat (PBR)	[Deleted]	i	
Patrol escort (PCE)	((20.000)	İ	
Patrol craft, inshore (PCF)		}	
Picket boat]	
Picket boat River assault craft (various) (RAC)		/iDeleted1	
Patrol craft (Coast Guard) (WPB)	,	Unescent	
[Deleted] (Coast Guard) [deleted]	2	ł	
Floating crane (YDB))	1	
Floating crane (YDB) Refrigerated covered lighter (YFR)			
Salvage lift craft, light (YLIC)	l .		
Gasoline barge (YOG)	VDeleted1		
Gasoline barge (YOĞ) Floating workshop (YR) Repair, berthing, messing barge (YRBM)	(Logistas)		
Repair, berthing, messing barge (YRBM)			
Sman narbor tug (TTL)		ł	
Medium harbor tug (YTM)	1	,	
Total	S[Deleted]		

¹ Subject to congressional approval.

OPINION OF VIETNAMIZATION PROGRAM

Chairman STENNIS. Senator Symington?

Senator Symington. Mr. Secretary, for some 5 years there was a major escalation of a war where we picked up a weak government in South Vietnam and gave it the support of the United States. These figures of 550,000 down to 435,000 don't really mean anything if you add the people in Thailand, the fleet, and all those we have in Japan, Okinawa, the Philippines, and Guam. The figure of Americans directly involved in the Vietnam war was much closer to 800,000; and that doesn't count people who are in this country producing goods here we send over there.

Testimony before this committee was that if we put up the money, which we are, to the tune of billions of dollars for this Vietnamiza-

tion, the same restrictions will apply to the South Vietnam military activities, shackling, that applied to our forces in these last 5 years. And the idea that, after our failure to bring this war to any military conclusion under these restrictions, with 800,000 fine Americans in the theater, it can nevertheless be accomplished by this Thieu-Ky government, which any fair-minded person would be the first to say is a relatively weak government, to me is just plain silly; therefore, I would hope the second facet, namely negotiation, is looked at long and hard.

I have not to date criticized the President about this war. He didn't get us into it, and I believe he is honestly trying to get us out of it. But when you see a presentation like that given by Admiral Moorer today, even if perhaps it is slightly parochial from the standpoint of the Navy's position, it only emphasizes where we should put our priorities from a military standpoint; and this before any consideration of the problems we have domestically, which you, as a former Governor of a great State, know only too well; heavy priorities that are large and growing. I don't see where the money is coming from if we keep on shoveling these billions into faraway Southeast Asia.

We had a discussion this morning in the office of the majority leader about the economy. Clearly we are in deep financial trouble.

We have increasing inflation. We have unprecedently high interest

rates; and now we also have increased unemployment.

Now, a few questions incident to your testimony. On page 1, you say "as of today only about 29,500 Navy and 52,000 Marine Corps personnel remain in or are based in South Vietnam. These numbers do not include such offshore naval forces as the 7th Fleet."

BREAKDOWN OF U.S. TROOPS IN SOUTHEAST ASIA

How many personnel are assigned to the 7th Fleet?

Secretary Chafee. Some 61,000.

Senator Symington. How many Navy and Marine personnel in such locations as Guam, Okinawa, and the Philippines would be considered directly connected with the war in Southeast Asia?

Secretary Chafee. I don't think that you could call the-well, we

could figure that out.

Senator Symington. Will you do that for the record?

Secretary Chaffe. Yes, sir.

Senator Symington. Thank you.

Secretary Chaffee. Guam——

Senator Symington. Guam, Okinawa, the Philippines. You might add Japan to that.

Secretary Chaffee. Yes, sir; Navy and Marines.

Senator Symington. Yes. Everything under your supervision.

(The information follows:)

There are about 61,000 personnel assigned to the Seventh Fleet.

We have approximately 4,900 Navy and 3,204 Marine Corps personnel based ashore in Japan, Okinawa, Philippines, Taiwan and Guam who are considered directly associated with the war in Southeast Asia. An additional 2,200 are in ships and units homeported in those countries. These personnel were authorized by the Secretary of Defense to accomplish the additional support requirements levied upon our existing activities as a result of the Vietnam conflict.

AREA SECURITY

Senator Symington. On page 1 you say "during 1969 the percentage of the population considered secure in I Corps tactical zone increased from 69 to 93.

Is this percentage considered secure by night as well as day? Secretary Chafee. Yes, sir.

Senator Symington. What percentage of the area in which the population in question resides is considered secure both day and night?

Secretary Charge. What percentage of the land area?

Senator Symington. What percentage of the area in which the population in question resides is considered secure at night as well as in the day. Based on your last answer, presumably you would say 93.

Secretary Chaffee. We took this as just percentage of the population. Yes. I suppose that could be the answer. What worries me is your referring—your question is area, whereas my figures relate to population.

Senator Symington. Would you supply an answer to that question? Secretary Chaffee. I am not sure I understand your question. Could

you give it once again? What percentage-

Senator Symington. What percentage of the area in which the population in question resides is considered secure by night as well as by

Secretary Chafee. In I Corps?

Senator Symington. Yes.

Secretary Charge. That may be difficult because as you know, these

reports generally deal with population rather than areas.

Senator Symington. Well, if you can supply an answer for the

record fine, and if you can't, I will understand.

Secretary CHAFEE. All right. (The information follows:)

Security is computed on a percentage basis by land area and by population on a 24 hour basis. We have no tables which separate and display day and night security. The figure [deleted] pertained as of the end of 1969 under an older Hamlet Evaluation System (HES) of measuring security. In January 1970 a new HES was instituted in Vietnam from which we received data after my statement was prepared. This new system was designed to be more accurate and objective in nature. Although under the new system percentages appear to be dropping, this is caused not by a loss of secure areas or population to the enemy, but rather as a result of transition to a more accurate method of measurement. Latest available figures under the new system of measurement are as tabulated below:

I Corps security by population

Classification: PopulationPercent	
I Corps security by area	
Classification: SQ KM'S Percent of Pop area	[Deleted] [Deleted]

SHIP CHARTER EXPENDITURES

Senator Symington. Your testimony on pages 12 to 13 reads, and I quote: Digitized by Google

For the immediate future, legislation is required which would authorize the Navy to charter ten multi-purpose ships and nine small tankers for an additional ten year period. The goal of this legislation would be to encourage private industry participation which the present five year charter authority has failed to do.

What will be the cost to the Government to charter these ships for

10 years.

Secretary Chaffe. Well, let me see if we have got that figure, but I do know this legislation has not yet been submitted to Congress and——

Senator Symington. I know you want us to understand it and part

of the understanding is, what is the cost?

Secretary Chaffe. It would cost \$218 million for 20 years just for the tankers.

Senator Symington. Suppose you supply that information for the record.

Secretary Chaffee. Yes, sir.

Senator Symington. I asked it for 10 years, but let's have all the facts.

Secretary Chaffee. Right. (The information follows:)

The bareboat charter cost of the nine tankers is estimated at \$218 million over a 20-year period. The estimated time charter cost of the ten Multi-Purpose ships over a 20-year period is \$751 million. These costs to MSTS should be discounted over a period of 20 years. At a 10% discount rate, the costs would be \$93 million for the nine tankers and \$284 million for the ten Multi-purpose ships. It is emphasized that the foregoing costs are estimates, subject to the give and take of negotiation.

LENGTH OF CHARTER

Senator Symington. What is different about this proposed legislation that will "encourage private industry participation which the present 5-year charter authority has failed to do?

Secretary Chaffe. Well, it is my understanding that, under the present short 5-year charter period, they are plain not interested in

going into it.

Senator Symington. Who is not interested?

Secretary Charge. The private industry people.

Senator Symington. By that you mean—

Secretary Charge. The bankers and financial concerns are not interested in financing construction of these ships on such a short-term basis.

Senator Symington (continuing). Who build the ships or people that operate them?

Which is it, the builder or the operator?

Secretary Chaffee. A banker or financial concern would provide funds for the builder or operator; however, in some instances, the builder or operator may provide their own financing. Our dealings would be solely with the operator. The operator would contract for the ship, obtain it, operate it.

Senator Symington. And he would use your contract with him as

collateral against his purchase of the ship?

Secretary Chaffee. Correct.

Senator Symington. Then why don't you buy it yourself. Why pay any profit on it? Why don't you operate in the Navy?

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Secretary Chaffee. One of the problems historically has been to obtain sufficient one-time funds for such an operation. A second problem is that these are going to be MSTS ships which merchant marine people would operate.

As I understand it, merchant marine people have been reluctant, not enthusiastic for the Navy to purchase these ships by themselves

and operate them.

Senator Symington. I can understand. The capitalistic system is now rapidly developing to a point where anybody who wants to do any business with the Government always likes the Government to guarantee any losses, and at the same time is, in my opinion, quite loose with respect to control of profits. If you want these, why pay an operator a profit plus the rent, which obviously is going to cost more than if you operate them yourself?

Secretary Chaffee. Well, I am not so sure it is obvious that it would

cost more than if we operated it ourselves.

Senator Symington. Am I to understand that you feel a price with a profit for the private operator would be less than the cost of the Navy operating the ship.

Secretary Chaffe. In the first place, we have to get the approval of Congress to get these things through. Apparently, in the past, one of the problems is that we haven't been able to get it through.

Admiral Moorer. Senator Symington, if I may-

Senator Symington. Admiral, would you clear me up on this?

Admiral Moorer. Yes, sir. We will be glad to give you some figures which show that on a long term basis it would probably be slightly cost favorable to charter. The main advantage, of course, is that it eliminates the need for a very heavy investment at the outset on the part of the Government.

Senator Symington. I appreciate that. We get these telephone books, these new requests. But they don't mean anything unless you under-

stand. So please put in the record why you give that testimony.

Admiral Moorer. Primarily to avoid the very large initial invest-

ment, Senator Symington.

Senator Symington. Someone said that of now you buy a \$20,000 house, on certain present terms, before you get through you pay \$35,000 in interest not counting what is paid for the house to the builders. Long term debt is one of the reasons we have some of these current serious financial problems.

(The information follows:)

A cost comparison between the Build and Charter, and Navy direct appropriations methods of ship acquisition shows that over a period of 20 years the charter method is slightly advantageous. This advantage assumes that the negotiated charter rate is within the estimated limits and the 20 year life cycle cost is discounted at ten percent.

For comparison purposes the following data is provided:

CHARTER VERSUS APPROPRIATED FUND-10 MULTIPURPOSE SHIPS

	Charter	Appropriated funds
Construction cost payment over 20 years.	\$425, 465, 160	
Construction cost payment on delivery. Dissimilar costs (overhead/insurance/profit).	40 124 556	\$240, 000, 000
Similar operating costs	276, 682, 600	276, 682, 600
Total, 20-year life cycle cost		516, 682, 600
20-year life cycle discounted at 10 percent.	283, 946, 350	288, 545, 890

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The cost for acquisition of nine diesel tankers under bareboat charter/hire agreement is estimated at \$218,402,179 based on level debt-service over 20 years. This cost consists of the bareboat charter contractor's investment in the tankers after reducing the ship construction cost by the equity sold to other investors, plus interest on the funds required to finance the owner's investment, plus a fixed fee to the owner to cover overhead and profit.

Although the cost to MSTS would amount to \$218,402,179, the cost should be discounted over the period of payment in order to arrive at a fair comparison with costs of having the ships constructed by the Navy with direct appropriations. The cost to MSTS discounted at ten percent of 20 years would amount

to \$92,973,807.

The costs to the United States Government of having the tankers constructed by the Navy with direct appropriations are estimated at \$118,143,790 with shipyard construction cost. This amount is not discounted since the expenditures for Navy construction would not be deferred.

REDUCTION OF U.S. COMMITMENTS OVERSEAS

Senator Symington. Mr. Secretary, on page 19 you say: "The second issue is that we will still need to make some difficult decisions necessitated by reduced budgets and a continuing high level of commitments. It is clear to me that we will not be able to continue numerous worldwide force deployments at present levels or to afford the variety of weapons that we have bought in the past. For weapons systems the choice frequently will be a few of several complex types or relatively more of a single, simpler type at a lesser cost.

You suggest a solution for the latter problem re weapons systems, but not for the first problem, a continuing high level of commitments. Would you favor a reduction of U.S. commitments overseas? And if so, with respect to Navy installations, where do you think we should

Secretary Chaffee. If we are going to operate a smaller Navy in a peacetime atmosphere in which we try to keep our people, we are going to have to reduce the commitments under these lower budgets. Otherwise, we just frankly are not going to be able to get the people to man the ships.

Senator Symington. Where would you start?

Secretary Chafee. I think where we could start is—well, these decisions aren't entirely up to me but if I had the recommendations, I think that we could perhaps vary the commitments [deleted] to

Senator Symington. Would you file a statement for the record on

that as to where you think it could be done?

Secretary Chaffe. Yes.

(The information follows:)

Senator Symington, the question you have asked concerning the impact of budgetary decisions on Navy worldwide commitments is exceedingly complex and most difficult to address specifically. As I have indicated, these decisions are not exclusively mine to make, nor can they be answered solely from a strict Navy perspective. Each possible force reduction must be examined individually and in almost every foreseeable case will be a matter of Presidential decision. Under these circumstances it would be premature to attempt any deeper judgment on this question at the present time.

Senator Symington. Mr. Chairman, I think my time is up. Chairman STENNIS. Thank you, Senator.

Senator Goldwater.



ALTERATION OF STRATEGY

Senator Goldwater. Thank you, Mr. Chairman.

Chairman STENNIS. Senator, will you excuse me just a minute? For the information of the committee, I hope we can take up the nomination of Mr. Tarr at our regular meeting Thursday morning for Selective Service Administrator. His name will have been here a week by then.

All right, Senator Goldwater.

Senator Goldwater. We recently had the concept of international commitments that might relate to war reduced from a so-called two-and-a-half war capability to one and a half. I imagine you would talk about oceans instead of war, wouldn't you?

Admiral Moorer. Yes, sir, and that was the point I was making here

in my briefing.

Senator Goldwater. I think you said that with this—let me put it another way. Could you have fought a one-and-a-half-ocean war with

the fleet before the reductions were made?

Admiral Moorer. I don't believe that we could get into the situation where one could define a one-and-a-half ocean war because of the fact that the ships travel worldwide. It is difficult for me to conceive of a situation wherein the Soviet submarines would sink a U.S. ship in the Atlantic but would not sink one in the Pacific, since they do have [deleted] submarines in the Pacific. The point I was making was that if we got involved with the Soviets in the Atlantic we would automatically be involved, in my view, in the Pacific.

Senator Goldwater. Well, let me put the question another way. Do

you think the Nay will be large enough to fight an ocean war?

Admiral Moorer. We would have extreme difficulty in fighting a two-ocean war against the Soviets with our current forces. The reduction in forces, of course, has in effect increased the risk that one runs in the event of such an engagement, and I think that under the present circumstances, particularly in view of the fact that the Soviets are expanding at such a rate, we would suffer significant losses at the outset of war, Senator Goldwater, more than we would have had we retained the other forces.

Senator GOLDWATER. Now at the present time the Indian Ocean is rather naked except for what little bit you have been doing there that we know about. What would happen to your already limited ability to

fight a war if the Soviets took the Straits of Malacca?

Admiral Moorer. Well, I think that would introduce a very serious confrontation which would, of course, affect not only the United States but in particular Japan. As you know, they get the bulk of their fuel from the Middle East, and if the Soviets in fact closed the Straits to normal shipping, I think we would have a world crisis on our hands.

Senator GOLDWATER. Well, if you extended that a little bit further and they gained control of the Indian Ocean, control of the Suez, control of Gibraltar, and denied us the use of Panama, we would be in

a real bad fix.

Admiral Moorer. Yes, sir. You have put your finger on what I call the four maritime gateways of the world. Since the United States is a maritime nation and depends on the sea for its security as well as for its economic viability, if they are closed we would in effect then be driven into a Fortress America posture.

Senator Goldwater. And if we lost these seaways, we would also lose our airways because we would be denied fuel and bases to land our aircraft. Is that not true?

Admiral Moorer. That is correct, sir.

(The information follows:)

This is a most important point relative to seapower. Airpower and other major aspects of our national power and those of our allies are highly dependent on free use of the seas. To the degree that an enemy can control the major seaways, our abilities to project the various aspects of our national power are proportionately reduced. The four Maritime Gateways are, in effect, choke points on the seaways of immeasurable strategic value. If we were totally denied the use of these gateways our posture would necessarily become defensive in nature.

As the Soviet Navy grows in size and power, so grow their capabilities to close or to control the Maritime Gateways. The only Navy in the world today capable of deterring the Soviets in this respect is the U.S. Navy. It is therefore vital to the interests of the United States and our allies that we maintain a navy fully

capable of providing that deterrence to the Soviets.

MK-48 TORPEDO PRODCUTION

Senator Goldwater. Now, getting back to some of your statement, is

the MK-48 torpedo now being produced?

Admiral Moorer. We let a contract on March 2, 1970, for long leadtime items for [deleted] MK-48 MDO-0's and expect to award a definitized contract for [deleted] torpedos later this fiscal year. In fiscal year 1971 we plan to produce [deleted] MOD-0's and [deleted] MOD-1's.

Senator Goldwater. How long have you been working on that?

Admiral Moorer. We have had a contractor working on this torpedo since June of 1964, Senator Goldwater. I would like to point out that this vehicle which is designed to operate at [deleted] feet at speeds up to [deleted] knots, and to use a very advanced sensor system, is perhaps the most complex device we have ever tried to put together because of the environment in which it works and because of the performances we have demanded from it. This was necessary in light of the fact that the Soviets were building [deleted] submarines, and in order to make our attack type submarines effective, it is mandatory that they have weapon systems with performance characteristics similar to this torpedo. We feel that we have solved most of these problems now.

The recent test results are encouraging. We are not going ahead on a large scale production until we are confident that the torpedo does work properly, and I would say that we are finally coming out of the woods in this particular area. But I would like to emphasize that this torpedo [deleted] and I think 6 years is not unduly long to build a device of this kind.

Cost

Senator Goldwater. Do you have a guess as to what the weapons

will cost, each?

Admiral Moorer. Yes, sir. I would like permission to correction this, because I am stating from memory, but if we look at it in terms of outfitting all of our submarines that we hope to build by [deleted] and include the cost of all of the tools, and so on, the test equipment, and also include in that the cost of training, and so on, it would cost us a little better than [deleted] a copy.

(The information follows:)

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FACT SHEET ON TORPEDO MK-48 PROGRAM COSTS

The total program costs for the MK 48 program including Mod's 0, 1, and 2 are summarized as follows, based upon data in the 31 December 1969 Selected Acquisition Reports:

		Millions
(a)	R.D.T. & E	\$ 345. 6
(b)	Production prototype	136. 9
(c)	Production	3, 270, 0
(d)	Total program	3, 752, 5
(e)	Quantity of production torpedoes through fiscal year	[deleted]
(f)	Production unit cost	[deleted]
	Program unit cost per production torpedo	
	Total program cost through fiscal year 1970	

HARRIER PROGRAM

Senator Goldwater. Now, one more question to you, General Chapman, about the Harrier. In the Tactical Air Subcommittee—I may be a little wrong in these figures—we found that after the first buy of 12, you have to contract with an American firm to finish up the buy of [deleted]. The figures, and here is where I may be a little bit off, the figures show that an American made Harrier would be 104 percent more in cost than a British made Harrier and personally I think that is a whale of an increase in costs that we have to pay for the aircraft that you want, and personally I would just as soon buy it from Great Britain as buy it here.

Do you have any "druthers" on it?

General Charman. Well, sir, it certainly costs more to buy in this country. I don't recognize that figure of 104 percent. However, the total of [deleted] if bought in Great Britain in the original 4-year program that we proposed last year would cost about \$400 million, to include all spares and the entire requirement.

Senator Goldwater. 385.3? General Chapman. Yes, sir.

Senator Goldwater. If we buy them in England?

General Chapman. In a 4-year program.

Senator Goldwater. [Deleted] to buy them in the United States.

General Chapman. In a 5-year program. So there is a difference both in the duration of the production as well as where. To buy them in the United States—to buy them in Great Britain, rather, in a 5-year program is a little more than \$100 million less than buying them in the United States in a 5-year program.

Senator Goldwater. Now, as I recall the figure, and you can certainly correct it, it was more than double per airplane.

General Charman. I will have to check that figure, sir. The figures I have given you are the differential dollars. The proper cost comparison is \$456.3 million for a [deleted] aircraft buy in the United Kingdom, which has the same yearly aircraft procurement of 18 [deleted] as the \$566.2 million program with the McDonnell Douglas Corp. The precise difference between buying in Britain and the United States is [deleted] million for the [deleted] Harriers required beyond the first 12 aircraft. This provides a cost increase of about \$1 million dollars per aircraft, and this increase includes spares and support. Comparing airframe cost alone, the unit airframe cost increases from \$970,359 in the fiscal year 1970 United Kingdom buy to \$1.9 million in fiscal year 1971 when we would buy from McDonnell Douglas Corp. This differential includes tooling, royalty to Hawker Siddeley, engineering costs, and U.S. labor which is nearly three times higher than United Kingdom labor. Average investment cost per aircraft including spares and support is \$5.47 million for the McDonnell Douglas aircraft and \$4.5 million for the aircraft built in England by Hawker Siddeley. By procuring the aircraft through McDonnell Douglas the U.S. Government will recoup a substantial amount of tax revenue that would further reduce the [deleted] million difference. This is a significant point for consideration in addition to the logistical support advantage.

Senator Goldwater. The biggest problem that we in this committee and the Congress face is the increasing cost of these weapons that you have no control over and I feel is caused by an unwarranted surge of wage increases that have not been earned, and my interest in buying

them in England is twofold.

One, to get them cheaper, and two, to warn our labor leaders that we have got to stop this sometime or we are going to stop defense and going to stop all the priority items that Senator Symington talked about. There has to be an end to it some place.

Mr. Chairman, that is all I have.

Thank you very much.

Senator Symington (now presiding). Senator Smith?

MEDITERRANEAN PORTS OF CALL

Senator Smith. Thank you, Mr. Chairman.

Secretary Charge. The Mediterranean countries that permit shore visits are: Spain, Italy, Malta, Greece, France, Tunisia, Morocco, Turkey, and Yugoslavia. Visits are also permitted in Gibraltar.

At the request of the Government of Yugoslavia visits there are

usually limited to one ship visit per quarter.

Although there have been demonstrations against some of our ship visits to Istanbul and Izmir, visits to Turkey are still being made on a regular basis but primarily to smaller Turkish ports.

SAVINGS IN SHORE FACILITIES

Senator SMITH. You spoke of some specific savings and plans for further savings in your statement. Would you elaborate a bit on this and tell us what you have in mind?

Secretary Charge. Do you mean in shore facilities?

Senator Smith. Yes.

Secretary Chaffe. Well, we are having a look at our installations in Japan, Sasebo, Yokosuka, Atsugi, and in the Philippines [deleted]. Those are the principal ones that we are looking at to see if we can consolidate some, eliminate others. This is a review we have under way now.

Senator SMITH. Do you have any idea when you will complete that

study and know something about it?

Secretary Chaffe. Yes. We think by the end of this fiscal year, by the end of June—the one directed principally to overseas bases.

Senator SMITH. When you read that transpscript, Mr. Secretary,

you may want to elaborate a bit more and give us anything you can on your planning for further savings if you will.

(The information follows:)

The Navy is currently undertaking a complete review of its base structure world-wide. The objectives of this review are:

(1) To ensure a proper balance between operating forces and supporting base structure.

(2) To determine the total Navy need for each type shore installation.(3) To determine by individual detailed analytical review, the portion of

limited resources we should devote to our base structure.

The purpose of this review is to provide a sound basis for decisions regarding the composition of the shore establishment and the best course of action for planning decreases.

SUBMARINE CONVERSION TIMETABLE

Senator Smith. Would you give us an estimate of the time that will be required to convert the POLARIS submarine to the POSEIDON submarine?

Secretary Chaffe. Yes. 14 months.

Senator Smith. 14? Secretary Chaffe. 14.

Senator Smith. And that would do everything, recording and everything?

Secretary Chaffe. Yes.

Senator Smith. Do you have an estimate as to the target date for all 41?

Secretary Chafee. Yes, we do, Senator Smith. We have got eight under way, six in this budget. It is only 31, Senator Smith.

Senator Smith. I am sorry.

Secretary Chafee. [Deleted] would be the last one. Senator Smith. [Deleted.] You say you have eight? Secretary Chaffee. Eight under way.

Senator Smith. And six in this budget.

Secretary Chaffee. Six in this budget.

HELICOPTER EQUIPPED SHIPS

Senator Smith. Of your 95, if I have that right, 95 amphibious ships, how many are helicopter equipped?

Secretary Chaffee. I just don't know, Senator Smith. Senator Smith. Will you get that for the record for us? Secretary Charge. Yes; how many have helicopters.

Senator Smith. Also, if you will tell us how many you have in the 6th Fleet and how many of those are fully equipped with helicopters.

Secretary Charge. I think we can tell you that right now.

General Charman. There are two kinds of helicopters basically on board the ships. The first are the Marine helicopters for ship to shore, Marine landing forces, and then some ships have their own helicopters for vertical replenishment and that kind of thing.

With respect to the Marine helicopter platforms in the Mediterra-

nean, there are none there now.

(The information follows:)

Due to Vietnam commitments, Marine Helicopter operations from Navy ships in the Mediterranean were discontinued in [deleted]. Our Caribbean forces have continued to include Marine Helicopter support. Digitized by GOOGLE

The Marine Corps has maintained at least one helicopter squadron aboard an LPH off the cost of Vietnam, as a part of the Special Landing Force, since Mach of 1965.

We are very much interested in returning to our former helicopter posture in the Mediterranean when sufficient Navy and Marine Corps assets become available.

Admiral Moorer. We did keep helos over there but since the beginning of the Vietnam war in 1965 we have funneled all the resources into Vietnam.

Senator SMITH. Will you look that over when you go over the transcript and give us the best that you can on the ships equipped with helicopters, in the Marines and Navy.

Secretary Charge. Yes. Senator Smith, would a ship that just has a landing place for a helicopter on the fantail, would that count under

vour-

Senator Smith. It would count if that completes the mission it is

for. I will leave that to you to—

Secretary Chaffe. Of the 95 ships in the Amphibious Force, 89 ships have facilities for operating helicopters. However, only six of these ships—amphibious assault ships (LPH)—are equipped for sustained, multiple, helo operations, their primary mission. During amphibious assault operations or exercises, the LPH embarks 18 to 24 CH-46 or equivalent Marine helos to transport troops and equipment ashore. The landing transport dock (LPD) has two operating positions (spots) and normally operates with an LPH utilizing helicopters from the LPH for offloading troops and cargo. The remaining ships have a helicopter platform, many of which have limited or marginal capability, from which a helicopter can be operated for vertical replenishment or troop/equipment transfer. Only the LPH has an organic helicopter assigned and operated by the ship's company; however the amphibious command ship (LCC) is assigned a helicopter when deployed. This helicopter is assigned for operational and administrative purposes. The helicopter is manned by a detachment from a helicopter combat support squadron.

Admiral Moorer. There are two ships in the Amphibious Force, 6th Fleet—an amphibious transport dock (LPD) and a dock landing ship (LSD)—which have limited facilities for handling helos. However, without an LPH with its Marine helicopter squadron, the helo facilities of these ships are not normally utilized. Thus, although troops can be moved from ship to shore from these ships by helo when operating with an LPH, their primary means of landing troops is by landing

craft and landing vehicle track (LVT).

Also there are underway replenishment ships and cruisers that normally carry helicopters, however, they are not troop carrying helos. Most 6th Fleet ships are capable of personnel transfer and replen-

ishment at sea using helicopters.

Senator SMITH. Mr. Chairman, when we were talking about the two and a half war and the one and a half war the other day, being prepared for them, we found that we had thought we were better prepared than we were and that is the reason for this question. I am trying to find out just how many we have of these ships that are ready to go in the case of need, Mr. Secretary.

SHIPS TRANSFERRED TO NAVAL RESERVES

Would you list for the record the ships and the age of the ships that have been transferred to the Naval Reserve?

Secretary Chafee. Yes.

Senator SMITH. Will you do that for the record. (The information follows:)

LIST OF SHIPS THAT HAVE BEEN TRANSFERRED TO NAVAL RESERVE TRAINING DURING FISCAL YEAR 1970

Ship's type and hull No.	Name	Age (years)	Ship's type and hull No.	Name	Age (years)
AGSS-342 DD-528	Chopper	25 27	DD-706 DD-731	Gainard	26
DD-630 DD-687	Braine	27 27	DD-757 DD-770	Putnam	26 26 26 26 26 26 26 26
DD-697 DD-698	Charles S. Sperry	26 26	DD-777 DD-778	Zellars	26 26
DD-701 DD-704	John W. Weeks Borie	26 26	DD-779 DD-781	Douglas H. Fox	26 25

AIRCRAFT TRANSFERRED TO RESERVE

Also of the-I think it is 200 aircraft that were transferred to the Naval Reserve. Will you give us a list on that and the age of those.

Secretary Chaffe. Types and ages?

Senator Smith. Types and ages, if you will.

(The information follows):

The following aircraft transfers into the Naval/Marine Reserves have been effected during the period 1 July 1969 to 1 March 1970:

Model/series	Number of aircraft	Average age in years (as o Feb. 28, 1970
-8K	27 50	11.
F-8G	5 9	11.6 6.0 8.1
-4C -1B -2F	126 4 38	8,9 9,0 5,1
P-2H H-34D	62 35	11.7 8.9 4.0
Total	364	7.3

During the same period, the following aircraft were transferred out of the Naval/Marine Reserves:

Model/series	Number of aircraft	Average age in years (as of Feb. 28, 1970)
TF-8A	58	12.7
RF-8A	. 1	12.4
TA-4B	109 38	11. 3 9. 1
SP-2E	5	15.6
SH-34J	Ř	9. 8
SH-3A	3	7. 0
Total	272	12, 0

Age since rework and conversion from F-8C and F-8B. Prior average age before conversion, 11 years.

RESERVE ACTIVITIES CLOSED

Senator Smith. Also will you list for the record the Naval and Marine Reserve activities that have been closed. I don't believe you

can give us that now, or can you?

Secretary Chaffe. I can give you the naval air stations that have been closed. We closed the one at Minneapolis, the one at Olathe, Kans., the one in Floyd Bennett Field, the one in Seattle, Wash., and Los Alamitos, Calif. Those are the five naval air stations. And the Naval Reserve units that have been closed, that must be over 70. And in nearly every instance—in every instance, I think I can say, of the Navy-Marine units that have been closed, there has been another Reserve unit within reasonable distance, that is, driving distance.

(The information follows:)

The following is a list of the Naval and Marine Corps Reserve Training Facilities/Centers and Naval Air Reserve Air stations, the disestablishment of which have been announced on 29 October 1969 and 6 March 1970.

[Key: NRTF—Naval Reserve Training Facility. NRTC—Naval Reserve Training Center. N&MCRTC—Naval and Markee Corps Reserve Training Center. NAS—Naval Air Station, NRCB TRAIN DETACH.—Naval Reserve CB Training Detachment]

State	Activity	disestal lishme
	NRTF, Miami	
	NRTF, Camden	
Jainomia	N&MCRTC, Compton	
	NRTF, Red Bluff	
	NRTF, Ukiah	
	NRTF. Petaluma	
	NRTF, Lancaster	Jun 30, 197
	NAS, Los Alamitos	June 30, 19
colorado		Dec. 31, 190
lorida	NRTF, Ocala	June 30, 197
ioorgio	NRTF, Athens	Mar. 1, 197
(08RO	NRTF, Idaho Falls	DO. 197
(antuaku	NAS, OlatheNRTF, Ashland	Do. Do.
NBH LUCKY	NRTC, Covington	Dec 31 19
onisiana	NRTF, Ruston	
Michigan	NRTF, Alpena	June 30, 197
	NRTC, Battle Creek	
	NRTC, Pontiac	Do.
	NRTC, Jackson	Do.
Minnesota	NAS, Twin Cities	June 30, 197
Mississippl	NRTF, Natchez	Dec. 3,190
	NRTF, Starkville	
Mantana	NRTF, Vicksburg	Mar. 1, 197
wontana Now York	NRTF, Miles CityNRTF. Ithaca	Doc. 31, 190
18W UIR	NRTF, Auburn	
	NRTC, Newburg	
	NAS. New York	June 30, 197
North Carolina	NRTC. Durham	Dec. 31, 190
	NRTF, Shelby NRTF, Statesville	June_30, 19
	NRTF, Statesville	Do.
Dhio	N&MCRTC, Canton	Do.
N. Ib	N&MCRTC, Steubenville	Dec. 31, 19
UKIBNOMB	NRTF, ChickashaNRTF. Enid.	
	NRTF, Shawnee	
Dregnn	NRTF, McMinnville	Do.
go	NRTF. Pendleton	
	NRTF Roseburg	Do.
Pennsylvania	NRTC. Neville Island	Do.
	NRTC, Bethlehem	Do.
	NRTC, Pawtucket	June 30, 19
	NRTF, Rock Hill	
ennessee	NRTF, Greeneville	
	NRTF, JacksonNRTF. Murfreesboro	Mar 1, 19
exas	NRTF, McAllen	UEC. 31, 191
1 6263	NRTF, Centralia	Mar. 1.19
Mashing Wil	NRCB TRAIN DETACH, Seattle	
	NRTF, Wenatchee	
	NAS. Seattle	June 30, 19
M	NRTF, Janesville	Do.

EFFECT OF CLOSINGS ON RESERVE STRENGTH

Senator SMITH. That is what I was coming to, about the commuting, if closing these didn't interfere with attendance, and what effect that would have on the strength of the Naval Reserve.

Secretary Chaffe. We don't think so. I am talking now of the surface units, not the air stations. In every instance I think there has been one relatively close by. These closings will affect us to some degree, but not in a substantial measure. In other words, the Naval Reserve strength will be able to remain in substantially the same condition it is now despite the closure of these facilities.

Senator Smith. Mr. Chairman, if when they get to the transcript, if they wish to—if the Secretary wishes to elaborate any more on any of these questions, I would like him to do it.

(The information follows:)

The determination to close the aforementioned Naval Reserve Training Centers/Facilities was based on economy and efficiency and such items as numbers of trainees, cost of maintenance, driving distance to the nearest facilities. Also the minimum impact on overall readiness was considered. Of the 49 activities announced for closure, the average distance is about 38 miles to the next facility, some being closer and a few farther. In a very few instances, the distances involved may preclude participation by some individual Naval Reservists.

In the case of the Naval Air Reserve, the basic criteria used in the determination was past performance and future potential of the activity. Due to the distances involved from the closed base sites, an airlift is planned in most cases using Naval Air Reserve aircraft to transport the reservists associated with reserve flying activities and who voluntarily commit themselves to ride this airlift. The remaining non-flying reserves will be supported by establishment of Naval Air Reserve Detachments in the respective local areas.

The Navy recognizes that there may be some short term instability as a result of base closures and affected unit relocations. However, in the long term, increased activities in other geographical areas will cause an off setting and stabilizing effect and the Navy presently expects to maintain the Authorized Naval Reserve Drill Pay Strength.

Senator Smith. I have several questions that I would like to place in the record to be answered by the Secretary and by Admiral Moorer at this time and then I will have some questions for Admiral Moorer the next time around.

Thank you very much.

Chairman Stennis. Thank you very much.

These questions will be inserted in the record. Now, as a general

rule, please have your answers back if possible within a week.

The answers are first sent to the questioner when they are received. Mr. Braswell, I know you have a system of keeping up with that. And if there are additional points to make on any question that has already been answered in part, that would go to the questioner, too. That is the only wav a Senator can keep up with their questions.

Senator SMITH. Mr. Chairman, a member of the staff has just called my attention to a line in the Secretary's statement to the effect that it would be necessary to relocate beyond reasonable commuting distance. Would you take that into consideration when you are answering for the record?

Secretary Chaffe. Yes, Senator.

FAR EAST POLICY

Chairman Stennis. This question here is addressed to the Secretary and Admiral Moorer. It has been touched on some. I don't expect an answer to it now but I want one or both of you to file a statement.

Some months ago President Nixon announced a new defense policy with respect to the Far East. He indicated that the United States would continue to maintain protection against all-out attack from China but, at the same time, allies could expect to rely more on their armed forces and resources with regard to conventional warfare.

Now, I am sure that the President will spell that out more in the future but for now, what effect would this broad policy, have on the Navy in your planning regarding conventional war in the Far East? That is a very broad question and perhaps for this budget it wouldn't

That is a very broad question and perhaps for this budget it wouldn't have any effect on your planning. If I had to answer right now as far as this budget is concerned, I would say it wouldn't have any effect. But I want you gentlemen to answer that and elaborate on it as much as you see fit. I am thinking about having it put in the record there, if it can be unclassified, where any Senator or his staff may look at it and Senators not on the committee would have a chance to really learn.

Excuse me a minute.

(Short recess.)

(The information follows:)

In addition to the President's statement that we could expect to rely more on the armed forces and resources of our allies, he also indicated that the United States would furnish military and economic assistance when requested and as appropriate. In regard to our allies in Asia, it becomes apparent that the military aid that will be required is that which can be provided by naval and air forces. This is the area in which they will be most deficient and will be most dependent upon the U.S. for support. It does not appear to be in the best interest of the United States to try to make our allies self sufficient in sophisticated naval and air forces, but rather have them prepare for their own defense by providing the manpower which is readily available.

We should not base our planning on the unrestricted availability of overseas bases to support unilateral U.S. actions in Asia. The downward trend in the availability of these bases, as well as increased restrictions on their use dictate that we concentrate on forces which are not subject to limitations imposed by a third power. Naval forces, by virtue of their mobility and ability to vary a commitment independent of a foreign power, are ideally suited to pursue U.S.

interests and support U.S. commitments in the Far East.

PREPARED QUESTIONS FROM SENATOR SMITH

(Questions submitted by Senator Smith. Answers supplied by the Department of the Navy.)

Question. How many modern shipyards does the USSR have, capable of building combatant ships? How many are there in the United States?

Answer. The USSR has four shippards (Sererodvinsk, Kalingrad, Khabarovsk and Sudomekh) which are devoted solely to the construction of naval ships. In addition, there are seven Soviet shippards (Gorkiy, Zelenodolsk, Zdanov, Nikolayev, Admiralty, Komsomolsk, and Kerch) which build both naval and commercial ships. All these yards have produced combatant ships.

The U.S. has four naval shipyards (Portsmouth, Philadelphia, Puget Sound and San Francisco) and one private shipyard (General Dynamics Electric Boat) engaged in naval construction and conversion only. There are also thirteen private shipyards with 2,000 or more employees in the U.S. which build both naval and merchant ships (Alabama Shipbuilding Corporation, Avondale, Bath Iron Works, Bethlehem Steel-Sparrows Point, General Dynamics-Quincy, Ingalls,

Jacksonville, Levingston Shipbuilding, Lockheed-Seattle, National Steel, Newport News, Todd-San Pedro and Todd-Seattle). Nine of these shipyards have produced combatant ships. Alabama Shipbuilding, Bethlehem Steel, Jacksonville and National Steel have built only auxiliary and amphibious ships.

Question. Is it still the Navy's plan to use multi-ship, multi-year procurement to encourage capital expenditures such as are necessary to build a new shipyard?

Answer. The Navy uses various procurement practices to solve various ship-building problems. The advantages to the government, such as ship standardization and the cost benefits of series production techniques, when combined with contract formulation/contract definition, continue to make multiship, multiyear procurement attractive when a significant bloc of identical ships is required. Where smaller procurements of ships are concerned, or ship performance has been previously established, it may be advantageous to use "lesser ship numbers to multiyard" procurement techniques. Encouragement of capital expenditure for building or improving new shipyards is an advantage in the multiyear-multiship procurement approach if no other advantages are negated by such an award. The Navy will continue to examine each ship procurement case and determine on its own merits which is the most advantageous to the Navy.

Question. Is the Navy cooperating with MARAD to encourage the shipbuilding industry to modernize its shippards?

Answer. Both the Navy and MARAD have recognized that multiship-multiyear procurement practices are needed if shipyard modernization through private capital investment is going to become a reality in the U.S. The total workload in any private shipyard is jointly monitored by both Navy and MARAD and contract awards are coordinated in order to assure production feasibility. Contract awards are not, however, allocated just for the purpose of sharing multiship-multiyear contract awards. Awards are made which best satisfy the total intent of a particular procurement.

Question. When does the Navy intend to announce the winner of the DD963 competition?

Answer. We expect to announce the winner of the DD963 competition in late April or early May.

Question. Does the Navy still plan to contract with a single source for 30 ships in the DD963 program?

Answer. Yes we do.

Question. Is it your present plan to stretch out the construction period in the DD968 program?

Answer. Currently, there are no plans for a stretch-out of the DD963 construction period. Ship delivery dates are keyed to contract award date which is expected shortly. The construction periods are as proposed by the contract definition contractors.

Question. Are you concerned about the ability of either Bath or Litton to man up for the DD963 program?

Answer. The ability of either Bath or Litton to man-up for DD963 procurement is being specifically addressed in the evaluation process. I will carefully review this matter, along with other areas, when the recommendations for the selection of the prime contract for this program are referred to me.

STATEMENT ON FAR EAST POLICY

Chairman Stennis. All right, gentlemen.

I have made clear that we will need some discussion from you on this Far East policy matter. I don't consider that the President has spelled it out enough yet for you to be specific, but I know it is coming up in debate and we ought to have something in the record even though it may have to remain classified.

(The information follows:)

In addition to the President's statement that we could expect to rely more on the armed forces and resources of our allies, he also indicated that the United States would furnish military and economic assistance when requested and as appropriate. In regard to our allies in Asia, it becomes apparent that the majority of military aid that will be required is that which can be provided by naval and air forces. This is the area in which they will be most deficient and will be most dependent upon the U.S. for support. It does not appear to be in the best interest of the United States to try to make our allies self sufficient in sophisticated naval and air forces, but rather have them prepare for their own defense by providing the manpower which is readily available.

We should not base our planning on the unrestricted availability of existing overseas bases to support unilateral U.S. actions in Asia. The downward trend in the availability of these bases, as well as increased restrictions on their use, dictate that we concentrate on forces which are not subject to limitations imposed by a third power. Naval forces, by virtue of their mobility and ability to vary a commitment independent of a foreign power, are ideally suited to pursue U.S. interests and support U.S. treaty obligations in the Far East.

MARINE CORPS PROJECTED PLANS TO MEET REDUCTION

Chairman Stennis. General Chapman, I had a chance to read over a statement from the Marine Corps as to their plans about meeting these reductions, and I was impressed. I was glad to get to see it. Some of it is included in your statement there, I am sure, but if it is not, you might put it in the record if you want to.

General Chapman. Very well.

(The information follows:)

I have directed a variety of actions to be undertaken within the Corps as I mentioned in my statement. One of these is to continue to emphasize the traditional mark of professionalism. I recently sent a letter to all General Officers and all Commanding Officers which I think might be of interest to you and can

best describe the overall program I have in mind.

1. Five years have passed since the 9th Marine Expeditionary Brigade landed in Danang and initiated the longest, and, in many ways, the toughest war in Marine Corps history. While diminishing in intensity, the end of this war is not yet in sight and many more months of dedicated priority effort will be required of our Corps there. More than 690,000 Americans have so far worn the Marine Corps uniform during this war and many more will; only 600,000 wore our uniform in World War II. Our record in Vietnam is one in which Marines of every age can be justly proud. It is a record made even more remarkable by the fact that a sizable number of Americans have not supported the war nor the men who fight it.

2. Now that our forces in Vietnam are diminishing under the President's program of Vietnamization, it is time to take stock and reflect on why we have done as well as we have under the most difficult circumstances we have ever

experienced.

3. In my view, a principal ingredient to our success was the professionalism of the Marines who were on the rolls when the war started. That professionalism was made up of many things, but it was grounded in the belief that high standards in performance and discipline are vital to battlefield success-high standards not just in military proficiency and physical fitness, but in military appearances, in military courtesy, and in the cleanliness and squared-away appearance of the area where we live, work, and train, all a reflection of individual and group discipline. The true professional is aware that these standards are not ends in themselves, that in fact, they are the means by which we breed pride, and that pride, in turn, builds the kind of discipline that is essential to victory in combat with minimum casualties.

4. Because of the professionalism we had in 1965, Marines were ready—ready not only to deploy and move into combat, but ready to take on greatly increased individual responsibilities. Most privates became noncommissioned officers; many noncommissioned officers became officers; and many officers were rapidly promoted to higher grades. Under the leadership of those pre-Vietnam Marines, hundreds of thousands of young Americans entered the Corps and performed magnificently.

5. Now that the size of the Marine Corps is returning toward pre-Vietnam levels, it is our individual responsibility once again to ensure that the professionalism of a smaller Corps can, if called upon, sustain us in whatever emergency the future may hold. In the austere years ahead, we, more than ever, need that fully combat-ready Marine force—high quality, high-spirited, professional, tough, lean, and highly disciplined.

6. It is our objective to achieve these goals during 1970, the critical year of transition, through the unrelenting personal efforts of all our officers and NCO's. We must reach this objective in addition to fighting our remaining units in Vietnam. Our principal actions, designed to tighten up and square away for the

future peacetime Corps will be:

a. To enlist or commission in the Marine Corps only those who meet the

highest standards.

b. To retain, to the fullest extent possible, only those who, by their performance, have demonstrated capability and dedication to the superior standards expected of them, and to separate from the Corps those who have not.

c. To pursue only those essential functions contributing directly to making the

Corps a superbly effective, ready, fighting outfit.

d. To ensure that the training given to each member of the Corps is designed not only for his professional development, but, more important, for the overall effectiveness of the Corps.

e. To assign to officers and NCO's challenging, demanding duties of ever-increasing responsibilities to further their development and increase their poten-

tial for leadership in any future crisis.

f. To evaluate objectively and professionally the performance of officer and enlisted personnel to ensure that high standards are being met; to deal promptly and decisively with any deviations from these high standards.

g. To ensure that each new Marine understands that with his uniform goes an esprit de corps based on pride in his Country, his Corps, his unit, and himself.

h. To bend every effort toward the improvement of living conditions of our Marines and their families, and to emphasize the importance of our responsi-

bility to our Marine families wherever they may be.

- 7. Our success will be determined by the individual effort of each officer and NCO, and, in particular, of each commanding officer. We must renew our awareness of each Marine's importance, his performance, his conduct, his loyalty to our Corps and to our Country, his physical fitness, his appearance. Whenever degradations in any of these are observed, prompt and effective corrective action must be taken. The example set by officers and NCO's in their performance of duty, dedication, devotion to their Marines, conduct, military bearing, physical readiness, and appearance must be above reproach. We must be continually aware of the true readiness of our men and the condition of our equipment. Only in this way can we hope to maintain the dedication to our long standing commitment to superior professionalism.
- 8. For the reasons I have mentioned I am requesting each of you to help me, each of you to dedicate yourself to this task, so that by the end of 1970 our Corps will continue to be, in the words of the 13th Commandant, General Lejeune, "... all that is highest in military efficiency and soldierly virtue." I know

our Marines can and will meet this challenge.

9. All officers and NCO's are to be informed of the contents of this letter and the spirit in which it is written.

REDUCTION OF MARINES IN VIETNAM

Chairman Stennis. Now, you indicate that your Marine Corps reductions in Vietnam from 82,000 in July 1969 to 42,000 in April 1970. Do you anticipate further reductions or does this represent a level for the time being? Does this represent a level for the time being? General Chapman. Yes, sir; it is.

COST OVERRUNS

Chairman STENNIS. You indicate, Mr. Secretary, on page 17 that the Navy was confronted with ship overruns ranging from \$800 to \$850 million and more over that there might be a possible addition of another \$350 million.

What is the total estimate now of cost overruns for the Navy at

the present time? Do you have that figure available?

Secretary CHAFEE. Yes. That is it there, Mr. Chairman, as of the present time. However you might ask why do we say there is a potential problem of \$350 million?

These are claims that might arise based on our experience with the various types of ships under contract or construction at this time. So

we just don't know.

Chairman Stennis. Well, you still stand on your \$800 million to \$850 million, then, so far as—

Secretary Chaffe. Yes.

Chairman Stennis (continuing). So far as known cost overruns. Secretary Chafee. Yes, sir.

(The information follows:)

I must add, however, that the \$800 to \$850 million represents total cost growth. We have taken action to fund about \$500 million of the total growth, so that our identifiable funding deficiency, as of the end of FY 1970, is \$310 million. Our financing actions included the cancellation of four ships in the FY 1968 and FY 1969 shipbuilding programs, reduction in other Navy procurement and reduction in the scope of other approved shipbuilding programs. We are requesting \$210 million for claims and other cost growth in the FY 1971 budget. This leaves a \$100 million deficiency for which funds are not required in FY 1971. I might note that we are making a vigorous effort to recover funds from the ships which have delivered and which will deliver during the remainder of FY 1970 and in FY 1971. To the extent that our recoupment efforts fall short of covering the remaining deficiency, funds will be requested in FY 1972.

I should relterate that, in addition to the \$310 million funding deficiency, we estimate that we have a potential cost growth problem in our prior year ship-building programs that could be as much as \$350 million. We cannot define explicitly this potential problem. Potential growth in these prior year programs will continue to be a matter of concern until their financial accounts are closed.

PROCEDURE OF WEAPONS SYSTEMS ACQUISITION

Chairman Stennis. All right. Now, let me say this, gentlemen. There has just got to be some kind of a change in order for the problems to be understood, not only in the Navy but all the other services as well. Now, this matter is out of my field but I have just got common sense enough to know when you have a new missile, before you know what problems you are going to run into and what difficulties you will have, even before you know just what the mission of this missile is going to be, you try and put a cost figure on it and this just won't work. You have got to have some kind of a ground rule to go by in talking about it to the Congress. But you are beating yourself to death, all the services are as I see it, with these new weapons, new concepts, and this will continue until you find some better way of doing business.

But I don't know—you can't even estimate what it is going to cost to

grow a cotton crop much less an intricate weapon.

It seems to me like you could say you would be within the range of minimum or maximum. That would help you a lot. You have been coming in here in past years—I am not talking about you men in particular but all the services—putting those figures in, and you are reaping the whirlwind now. Maybe Congress is to blame for some of it.

Secretary CHAFEE. Yes, sir.

Chairman Stennis. Do you want to respond to that?



Secretary Charge. Yes.

Chairman STENNIS. And then I have another question about this cost overrun.

Secretary Charge. I think taking-

Chairman STENNIS. What are you going to do about it? That is what I want to know.

Secretary Chaffee (continuing). Well, let's differentiate between a ship and a new weapon system.

Chairman STENNIS. Yes.

Secretary Chaffee. I think when we attempt to put a price on a new weapon system just starting development, it is a mistake because that price always comes back to haunt us—it is then said to be an overrun.

Let's take this MK-48. On that television program the other night the commentator said this weapon system has \$4 billion cost overrun

or cost growth, however you want to phrase it.

If you take the original estimates and if we go into production, it will be a cost growth of that nature, but it isn't something that is sneaking up on Congress by surprise. It is a "fly before buy" project if you want to call it that. We have spent \$450 million on this project so far. If the decision is not to go ahead with it, which I certainly don't think would be the right decision, it is not going to cost the sum that Mike Wallace was talking about on this program the other night, that is \$4 billion

I think the important thing in some of these initial developments would be to come in and say we are feeling our way along and that we would like a little money to develop what we consider is a very important weapon. Then through the SAR reports which come to you, we could show our costs. This would perhaps be a better way than our saying originally that 6 years from now a production of 2,000 of these is going to cost x dollars, because that figure is always held against us.

Chairman Stennis. Yes, sir; and it is devastating. You just have to find some way to separate the original research when you are toying with the idea from when you get into the hard research. Then have another breakoff point when you decide whether or not to go into prototype or whatever the next phase might be, and then when you

go into production.

Now, when you charge these great numbers of dollars as being overruns, every newspaper in the United States has it on the front page that afternoon or the next morning, and radio and television. Somebody goes somewhere to explain it assuming there is an explanation and you hear that.

Secretary Chaffee. One of the problems, Mr. Chairman, is that everybody always likes to know in advance what we think a new development is going to cost. Maybe our mistake is even venturing a guess.

Chairman Stennis. Well, some of it may be bad management on

your part, too, I mean the services.

Secretary Chafee. Well, some of it is. Chairman Stennis. On these items.

Secretary Charge. I am free to admit that.

Chairman STENNIS. As one Member of the Senate, I am guilty of being too insistent in years past on a dollar figure being given early, and I see now where it is unrealistic. That is why I bring it up here, to emphasize it. It is a problem.

Now, going back to another one of these cost growth overruns—

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SHIPBUILDING OVERRUNS

Admiral Moorer. Mr. Chairman, before you get into that statement may I make a comment about the shipbuilding deficit?

Chairman Stennis. Yes. Be fairly brief. My time is almost up.

Admiral Moorer. Yes, sir. The claims portion of the \$800 million to \$850 million deficit covers 139 ships over 12 years, and the total SCN program during that time was \$23 billion. So just to put this in perspective, this is not just a few ships. This applies to a 12-year pro-

gram totaling \$23 billion.

Chairman Stennis. That is a good point, indeed it is, and you ought to nail that on the masthead every time these figures are used

about cost overruns. Why has it been delayed?

Admiral Moorer. Well, in some cases ships were delayed. Some were submarines as where we went into what we call the sub-safe program after we lost the Thresher. It took several years longer to build the submarine than we anticipated and, then the normal redtape of grinding out the claims just took this long.

Chairman Stennis. Well, while we are on it, if you will yield to me a minute or two more, you have \$210 million in this bill for cost overruns for Navy ships. It is understood that this entire amount is

for Lockheed overruns. Is that correct?

Secretary Charge. No, sir. We don't even have that much of a claim from Lockheed. We have a claim from Lockheed of about \$174 million, so that is not accurate.

Chairman Stennis. Well, that is an error. Now, they don't have claims and all amounting to this \$210 million?

Secretary Chaffe. No, sir; \$174 million.

Chairman STENNIS. All right.

Admiral Moorer. The \$174 million claim from Lockheed is their own claim and it has not been adjudicated.

Chairman Stennis. Well, is the \$174 million out of this \$210 to

Lockheed?

Secretary Chaffe. No.

Chairman Stennis. Or any amount of it and if so, how much? Any

part of the \$210 million?

Secretary Chafee. The \$210 million is to pay back past claims and cost growth and to whittle away at this \$800 million. How much of it will go to Lockheed will depend on how much of Lockheed's claim is adjudicated this year.

Chairman Stennis. Well, does this mean you have already adjudi-

cated \$210 million worth of claims?

Secretary Charge. No.

Chairman Stennis. Or are you just estimating.

Secretary Chaffe. We are estimating that the \$812 million is a solid figure which falls within our \$800 million to \$850 million estimate. We have got to pay it. We have decided it will be necessary to get the money from this appropriation. So we are taking part of the money from this appropriation to pay for both claims and cost

Chairman Stennis. So the whole amount of money in the bill, then,

is just \$210 million.

Secretary CHAFEE. That is right.

Chairman STENNIS. And Lockheed may share in that some but it is by no means all.

Secretary Chaffe. Yes, sir. (The information follows:)

As I noted earlier, we have already taken action to fund about \$500 million of the \$800 to \$850 million total growth. Some of the \$500 million and some of the \$210 million is allocable to Lockheed built ships. The exact amounts will depend upon the results of the adjudication process which is underway now.

FORCE LEVELS

Chairman Stennis. Thank you very much.

Senator Symington.

Senator Symington. Admiral Moorer, on page 1 of your statement you outline the force levels for the fiscal 1971 budget supports. There has been some discussion of that this morning. I want to be sure I understand your position.

Are these force levels in line with President Nixon's one and a half

war strategy?

Admiral Moorer. In my view they are, yes, sir.

Senator Symington. What were the Navy force levels under the previous administration's so-called two and a half war principle?

Admiral Moorer. As the Secretary of Defense has said several times, we never did have the forces required for the so-called two and a half war strategy, Senator Symington. As I indicate in my statement, the current forces represent a reduction of 175 active fleet ships and 732 active aircraft from the end of fiscal year 1968.

ULMS ESTIMATED COST

Senator Symington. On page 16 you say "the proposed undersea long range missile system, or ULMS, to supplement our POLARIS and POSEIDON forces and continue toward the optimization of the Nation's strategic offensive force mix. What is the estimated cost of ULMS?

Admiral Moorer. Well, sir, you mean per unit?

Senator Symington. Yes.

Admiral Moorer. We estimate that the ship itself, Senator Symington, and may I have the opportunity to correct this for the record because we are still studying it, will be somewhere between [deleted] and [deleted] million average cost in series production and, of course, in addition to that we would require the missile. So the ship as we now view it would be somewhere in the neighborhood of [deleted] tons, with [deleted] missiles having a range of [deleted] miles.

Senator Symington. And this would take the place of the PO-

LARIS and the POSEIDON?

Admiral Moorer. Ultimately it would, sir. The question as to the mix between the ULMS and the POSEIDON would depend upon the strategic situation at the time. We wouldn't expect this submarine to be in operation until the very late 1970's.

Senator Symington. Will you supply for the record the cost of the POSEIDON, the POLARIS, the cost of the ships and the cost of the

missiles, just a full comparative detailed cost.

Admiral Moorer. Yes. The entire program. (The information follows:)

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POLARIS-POSEIDON COST COMPARISON FLEET BALLISTIC MISSILE SUBMARINE In thousands of dollars)

	New con- struction 1	Conversion and concurrent overhaul		
		C-3 conver- sion	Concurrent overhaul	Total
Total	101, 154	32, 722	39, 943	72, 665
FBM weapon system	28, 176	20, 722		20, 722
System integration and support Launching subsystem Fire control subsystem Navigation subsystem Test instrumentation Missile checkout equipment	1, 387 6, 469 5, 571 10, 380 600 3, 769	3, 841 6, 584 5, 945 1, 501		898 3, 841 6, 584 5, 945 1, 501 1, 953
Ship system	72,978	12,000	39, 943	51, 943
Shipyard effort	52, 979 10, 189 2, 071 1, 297	12,000	33, 904 1, 303 945	45, 904 1, 303 945
Hulf, mechanical, and electrical equipment	2, 555 3, 887	••••••••••••••••••••••••••••••••••••••	3, 057 734	3, 057 734

Based on costs for SSBN 602, for which the cost most closely approximated the average. (Fiscal year 1958.)
Based on the average for the 6 ships in the fiscal year 1971 budget request.

POLARIS-POSEIDON COST COMPARISON-MISSILES, EXCLUSIVE OF AEC PARTS

	POLARIS A-3	POSEIDON C-3
1st procurement	Fiscal year 1963 [deleted] \$2,000,000	Fiscal year 1969 [deleted] \$3,700,000. Fiscal year 1970 [deleted] \$3,300,000. Fiscal year 1971 [deleted] \$3,100,000.

Note: POLARIS unit costs include spares. Changes in costing procedure for increased efficiency have resulted in POSEIDON spares being costed separately rather than being directly included in unit costs.

ROLE OF SABMIS

Senator Symington. One page 17 you say:

A sea-based ballistics missile defense system, or SABMIS, is also being investigated. Deployments of this system in the adjacent sea buffer areas would permit interception of intercontinental ballistic missiles before they reach the U.S. battle area and complement the SAFEGUARD systems to provide a defense in depth. Two such systems on station could provide light defenses against ICBM's of the population, forces, and command centers located within the continental United States, Appropriately positioned they could also provide interception of submarine launched ballistic missiles.

All of this is getting pretty complicated. Yesterday I tried to call New York and was told I couldn't get any number up there because of failure of the lines. The SAFEGUARD system is infinitely more complicated than any telephone system, in New York or anywhere else. I worry about the Maginot Line concept of SAFEGUARD, the premise that everything will be working perfectly on some Sunday afternoon like December 7, 1941.

If the light area defense concept of SAFEGUARD is not intended as the first step in deployment of a thick ABM, which we are told it is not-although if I was a Russian I would think it was-and only two SABMIS systems could provide such a light area defense, could

Note: This table compares the construction costs of a typical single Polaris submarine with the average costs of a single Poseidon conversion.

SABMIS replace the area defense concept of SAFEGUARD and thereby eliminate the need for PAR's, MSR's and SPRINTS and SPARTANS all around the continental United States?

Admiral Moorer. Well, we don't think of SABMIS as a replacement for SAFEGUARD but rather as a complement to it to provide

defense in depth.

Senator Symington. I understand that. Will you supply an answer for the record after you have looked thoroughly at the question?

Admiral Moorer. Yes, sir.

(The information follows:)

Sea-based antiballistic missiles can contribute significantly to the strategic sufficiency criteria of recently-defined strategy. A small number of forwarddeployed units could provide a light area defense of the Continental United States against the Chinese and other Nth country threats, and at the same time give some protection and contribute to area defense against Soviet Intercontinental Ballistic Missile threats to the Continental United States. Other sea deployments around the Continental United States could help meet the Sea-Launched Ballistic Missile and Fractional Orbital Bombardment System threats, contributing to a defense for urban/industrial areas, as well as CONUSbased bomber and missile forces and command and control authorities.

Senator Symington. What is the 10-year-systems cost of a SABMIS light area defense as compared to the present SAFEGUARD light area defense system? This would of course include all the R. & D., procurement, construction and operation and maintenance cost for 10 years of a fully deployed system?

Admiral Moorer. I will supply that for the record. It will be a

SABMIS only on paper.

Senator Symington. Thank you.

(The information follows:)

Our present SABMIS system cost estimates are based on a 1968 contractor conceptual study updated to FY-70 dollars. Estimated 10 year systems cost, including Research & Development, initial acquisition (excluding Atomic Energy Commission costs) and 10 years direct operating is [deleted] for a light area defense [deleted] SABMIS Ships and [deleted] for a damage denial capability against the Chinese threat [deleted] SABMIS ships. It is emphasized that these cost estimates are based on the conceptual study.

Senator Symington. In the recent Defense Department review of ABM systems and alternatives was SABMIS considered?

Admiral Moorer. I think it was, sir. At the Department of Defense level.

Senator Symington. Then why was SAFEGUARD in your opinion selected in lieu of SABMIS?

Admiral Moorer. Well, of course, SAFEGUARD, Senator Symington, is in the hardware stage and further advanced for one thing; we are just looking at SABMIS in terms of a feasibility study and things of that kind.

(The information follows:)

Although the sea-based ABM concept has been proposed for a number of years, sufficient resources have never been allocated to adequately refine this concept to the point where Engineering Development and Contract Definition of a seabased ABM alternative could proceed. One reason that SABMIS was not selected may have been the belief that it could not be available in the same time frame as the land-based SAFEGUARD.

NAVAL OBJECTIVES

Senator Symington. Now, on page 21 you say re an attack by Warsaw Pact forces, the testimony reads, and I quote "First, control of the Mediterranean would have to be settled quickly in the allies' favor or NATO would be outflanked to the south.

"Secondly, control of the exit from the Black Sea would have to be maintained and the isolation of Greece and Turkey prevented."

Given the current United States and Soviet naval capability, in your

opinion could the U.S. Navy meet the above objectives?

Admiral Moorer. Speaking in terms of general purpose forces, at the present time I think we could in the Mediterranean. At the same time, we would have to question the Turks' ability, for instance, to hold the Dardanelles. There is no question about the fact that the Mediterranean is vital to Western Europe because without the oil, which comes through the Mediterranean, Western Europe would be short lived. This is why I say that control of the Mediterranean must be maintained if the allied nations and NATO are going to survive.

Senator Symington. I think Japan is even more interested in the oil of the Middle East today than Western Europe. But in any case, would this meeting of objectives entail the use of nuclear weapons?

Admiral Moorer. No, sir. We certainly wouldn't initiate the use of nuclear weapons. If the other side chose to use nuclear weapons we would be forced to retaliate accordingly.

Senator Symington. Would it entail drawdowns of any substantial

amount of Naval forces in the Pacific?

Admiral Moorer. [Deleted.] The current plans for NATO, and, as a matter of fact, the plans that have been in existence some time as you know, Senator Symington, [deleted].

Senator Symington. Would aircraft carriers play a part in the

scenario?

Admiral Moorer. Yes, they would.

(The information follows:)

Attack carrier striking forces would play a major role in this scenario. First of all, a war in NATO also involves the Navy in a war in the Pacific. The Soviets are an Asian as well as a European nation and the significant capabilities of the Soviet Pacific Fleet pose a formidable threat to Alaska, Hawaii, and other U.S. possessions in the Pacific, in addition to the west coast of the United States. Our attack carrier striking forces would retain their essential role in maintaining the sea lines of communications to and from the continental U.S. and our far-flung Pacific territories as well as ensuring the capability to provide continued support to our allies. In the forward area, carrier launched strikes would contribute greatly to the destruction of the Soviet Pacific Fleet at the source through hit and run coordinated air attacks, and by mining operations.

In the Mediterranean, the CVA has many roles. First and foremost, the attack aircraft in the CVA provide a "kill capability" that can be directed against Soviet surface units well beyond the lethal range of the anti-ship missiles of their Mediterranean Squadron. It is the U.S. attack carrier that provides offensive striking power to NATO, since the naval forces of the European NATO nations remain primarily defensively oriented. The sea-based tactical air power of U.S. carrier striking forces must ensure the control of the Mediterranean and its contiguous littoral remains a NATO prerogative. Additionally, the CVA provides an air "umbrella" beyond the range of land based tactical fighters to safeguard the air approaches to Europe and guarantee the integrity of our sea lines of communications to the Atlantic community and to the Mediterranean. Our revised strategy depends heavily on the initial capabilities of our NATO partners and our ability for rapid reinforcement of their efforts. We can and must expect

the full range of Soviet long range air, naval surface and submarine capabilities to be directed against our sea lines of communications in the Atlantic and Pacific. Such efforts to interdict our lines of sea borne logistic supply, to cut us off from our NATO partners, particularly in situations requiring reinforcement from Pacific as well as Atlantic resources, will demand maximum and continuing

support from our attack carrier striking forces.

The CVA also has a major role in support of the land campaign, be it the Central Front or northern and southern flanks. Attack carrier forces would provide a relatively invulnerable hedge against the likely neutralization of major airfields at the outset of any conflict and could furnish effective front line support, pending reestablishment of land based tactical air forces. The complementary nature of land and sea based air is a well-established element of joint planning to diversify military strength. This diversification—or "mix"—of offensive tactical air capabilities causes an enemy to dilute his own resources, both offensive and defensive, and increases the chances for survival of all our forces. Further, this "mix" tends to ensure that under the worst conditions, at least one system will remain operational to counter the enemy. Moreover, carrier based tactical air capabilities can provide a "surge" action to augment land based air forces rapidly should major enemy thrusts require such action.

The CVA provides our nation with a mobile weapon system whose capabilities cover the entire spectrum of modern warfare. It has the capability of participating in a conventional conflict, escalating to the tactical nuclear threshold and finally, of conducting nuclear strikes at the level of strategic nuclear war. More importantly, our attack carrier striking forces provide the U.S. with a highly

mobile and relatively survivable deterrent to all levels of conflict.

CHINESE AIR CAPABILITY

Senator Symington. On page 24, Admiral, you say, and I quote "The larger and more sophisticated Chinese air effort would require the early employment of all available carrier strike force resources."

How many sophisticated aircraft do you believe the Chinese have

and what are the types?

Admiral MOORER. Well, they have the MIG varieties and they have—here we are right here. I have a table of them, sir.

Senator Symington. I don't think they have any truly sophisticated

aircraft, say MIG-21's. They have 19's and IL-28 bombers.

Admiral Moorer. Let me put this table in the record if I may. (The information follows:)

Chinese Communist Air Force Order of Battle, January 1, 1970

Day fighters:	
Fagot (MIG-15)	[Deleted]
Fresco A/B/C (MIG-17)	Do.
Farmer D (MIG-19)	Do.
Fishbed C ¹ (MIG-21)	Do.
All weather fighters:	
Farmer B (MIG-19)	Do.
Fresco D (MIG-17)	Do.
Total fighters	Do.
Attack: Beast	Do.
Bomber/fighter: Fagot (MIG-15)	Do.
Medium bombers:	- · · · · ·
Badger (TU-16)	Do.
Bull	Do.
Total medium bombers	Do.
Light bombers:	D 0.
Beagle (IL-28)	Do.
Bat	Do.
Total light bombers	Do.
Reconnaissance: Beagle 1 (IL-28)	Do. Do
Helicopters	Do.
1 Can be used as hombors	10.

¹ Can be used as bombers.

Senator Symington. The other subject I was distressed to hear one of my colleagues say the troubles were the wage rates people were asking in this country. Anybody in the Navy knows you don't buy much today with what you get in the way of dollars against what you used to. Certainly the Army, Navy, and the Air Force could not ascribe the Lockheed problems which they are all now in, to any wage requests made by the working people of the United States; therefore I do not agree that this problem has to do primarily with wage rates.

All Americans like to live decently. One of the reasons many corporations are putting work into other countries is because, in doing so, they can take advantage of the relatively low standards of living of

said other countries.

I would say therefore, that wage rates are a relatively unimportant

aspect of some of these sudden and heavy increases in costs.

The MK-48 torpedo I understand has gone up in cost estimate from around \$600 million to \$3.7 billion, a cost estimate increase of around \$2.9 billion. These figures have been given to me by the staff.

As I understand it, the Navy is asking for \$36.3 million in research and development funds for the MK-48 program in fiscal 1971 and \$110,600,000 in production funds to purchase MOD-0 and MOD-1 torpedoes. The Armed Services Committee has authorization authority for research and development funds but not for these \$110,600,000 production funds. This production money is carried with the Navy called OPN, other procurement Navy. Therefore, under present law, the Armed Services Committee, and I would hope the Chair would take notice, apparently has no authority concerning the procurement of this MK-48. I would hope this committee would have authority about the procurement of this weapon the way things are going. The total Navy OPN funds, if we understand it, are \$1.6 billion, broken down into the following categories.

Ship support equipment, \$515,400,000 million, communication and electronic support equipment, \$263,400,000; aviation support equipment, \$336,800,000; ordnance support equipment, \$423,400,000; civil engineering support equipment, \$48,600,000; supply support equipment, \$6,500,000; and personnel and command support equipment

\$25,100,000.

Torpedo purchases in the past, such as the Mark 37, have been procured through this account. So this procedure is the rule and not an exception. The committee does authorize missiles, but the torpedo is not considered a missile.

The Navy OPN account also includes \$5½ million for Mark 48 support equipment such as fire control, launch and training equipment.

Of interest would be that this section of the Navy's OPN also includes \$38,100,000 to buy ROCKEYE, \$3½ million to procure WALLEYE, and \$75 million for MK-82 500 pound general purpose bombs. ROCKEYE is a ballistic bomb and WALLEYE, as we all know, is a glide bomb.

Mr. Chairman, I would recommend that the Armed Services Committee take a position about the estimated cost of procurement of the Mark 48. Second, I recommend the Armed Services Committee take steps to bring the torpedo and other OPN funds under authorization

authority.

This is going to hit the floor and could create headlines comparable to the C-5A, because, if these figures are accurate as given by the staff,

it is the largest single major cost increase ever. The fact the procurement amount is somewhat masked is not too good for the Navy and

not good for this committee.

I would hope, therefore, Mr. Chairman, that all OPN items over a million dollars be provided for the committee record as a matter of information. I hear, Mr. Secretary, the House has indicated they would take such action.

Admiral Moorer. May I make two comments?

First, we are not trying to mask anything, and second, the costs that you are using, of course, extend out to [deleted]. In other words, this money is not committed, obligated, or even authorized.

Senator Symington. That is right.

Admiral Moorer. So it is a question of how far we go with the program in the future.

Senator Symington. But these are your figures, not ours.

Admiral Moorer. I am not quarreling with the figures.

Senator Symington. Let me emphasize that I wasn't saying the Navy was masking anything. But the information on this torpedo was masked from me as a longtime member of this committee. I didn't know it would cost anything like this; in fact, I didn't know anything about it at all until this was told me first by a staff member of another committee. So I would hope we could include it as part of normal procurement routine before this committee, inasmuch as I am certain it is going to be investigated by another committee. It seems to me to be primarily an Armed Services Committee matter.

Secretary Chaffe. May I say one thing? I think there is quite a difference between this torpedo and other weapons. I don't want to knock the C-5A but you used that as an illustration. With respect to the Mark 48, we are not trapped into bailing our way out of paying for it. If Congress wants to go ahead with it—as I hope they will—they will know the price. But I think there is a lot of difference between

this and the traditional cost overrun.

Senator Symington. I agree.

Secretary Chaffee. For instance, you asked Admiral Moorer-

Senator Symington. I am talking on the basis of an ounce of prevention being worth a pound of cure. Re Lockheed the Navy is involved with some kind of a plane, is it not?

Secretary Charge. The S-3, yes.

Senator Symington. I think the Army is too involved with Lockheed as to a helicopter, is it not?

Secretary Chaffee. Cheyenne.

Senator Symington. Those are in a different category than the Mark 48. On the other hand, this would appear the time to get this matter clarified, inasmuch as these are your projection figures, not ours; instead of letting it build into something like this seaplane—submarine detection plane, is it not?

Secretary Chaffe. S-3, yes.

Senator Symington. Or the Cheyenne, now a \$3 million or thereabouts helicopter, and the C-5A, the tragedy about which is now well known to everybody.

Admiral Moorer. In all fairness let me say the P-3 program which the Navy has had underway for many years as well as the POLARIS/POSEIDON program, both of which are Lockheed contracts—and we would be happy to supply any amount of data for the record as to the results of those contracts—have been very successful. We are very satisfied. We haven't had any fiscal or technical problem.

(The information follows:)

To place the Navy's experience with Lockheed in perspective, it might be well to consider performance in the POLARIS and POSEIDON programs to date.

Since the start of the POLARIS program in 1956 there have been 255 contracts with an aggregate value of over \$4,946 million awarded to Lockheed Missiles and

Space Company of Sunnyvale, California.

Of the forty-two major contracts (\$5 million or more) since 1963 twenty-three have been cost-plus-fixed-fee, one was cost-plus-award-fee, ten were cost-plus-incentive fee, and eight were fixed-price with incentives. These forty-two contracts have a negotiated value of \$3,126 million, compared with a proposal value of \$3,398 million. The difference of eight percent between the contractor's proposal and the negotiated value (unadjusted for changes in scope) is an average reduction within a range between -35% and +12% (including changes in scope after submission of the proposals).

Contractor performance has been remarkably close to target cost, considering the size and complexity of the program and the urgency attending many procurements. There were fifty-seven POLARIS contracts with a total value of \$1,868 million that underran by an average of 4.5%. Fifty-two other POLARIS contracts with a total value of \$1,591 million overran by an average of 6.8%. On a total of 125 of the largest POLARIS contracts the net variation was less than

one percent.

At present Lockheed holds ten POSEIDON contracts with a total value of \$1,519 million. No overruns are currently expected, and projected underruns on two of the ten are very small in value. More importantly, the Navy is obtaining a missile subsystem that promises to fulfill or exceed target performance, tending to validate the effectiveness of the incentive fee provisions. The fact that a follow-up missile procurement has been negotiated using cost experience from the initial POSEIDON production contract is convincing evidence that neither the contractor nor the Strategic Systems Project Office expects a significant overrun.

Senator Symington. I think that is fine, and have always felt the Navy, logistically speaking, was better than the other two services; but these are your figures on this torpedo. I hope, when you come up in 1983 to defend the Mark 48, you can say the same things about it you say about the POLARIS.

Thank you.

Chairman Stennis. Thank you, Senator.

As one who remembers quite well the history of this procurement authorization, and the very first time it was mentioned around this

table, I just want to state how this developed.

The Senator from Vermont, Mr. Flanders, was a member of this committee a number of years ago and he brought it up the first time. Senator Russell was very much impressed with some points Senator Flanders made. While I was handling the military construction bill, Senator Russell and the committee decided to put it in as an amendment to the military construction bill.

We started out with just the hardware, ships, planes, etc.

There was considerable discussion in conference that year on this matter. There was strong opposition to it at first from the House,

but they were interested in the subject and it was finally agreed on. It didn't take long to find out that we had overlooked a big item and that

was research and development.

So we amended it to include R. & D. We didn't realize how much we were getting into until last year. Then we added something else, even for the rifles and the Mark 48. No one had ever thought about specify-

ing torpedoes. They have an origin older than missiles.

Senator Symington. If the Chairman will yield, I think of all people who have emphasized the importance of authorization, Chairman Stennis leads the field. The point about it; anybody knows you can't absorb all these details overnight. You get these, in effect, telephone books. An authorization look before appropriations give us here two looks.

We get a look now, then can discuss it with our staffs, think about it. Later on it comes up in appropriations and we can formulate an opinion based on the facts instead of on theory or lack of intelligent

understanding.

The best Chairman of Joint Chiefs' presentation ever made since I have been around was the first Chairman I ran into after coming on this committee. That was Admiral Radford, because he used to come up here and show what the enemy had, and what we had as against what the enemy had. The CIA tells all about what the enemy has but can't tell anything about what we have; that they feel is none of their business.

Nobody in any of these hearings really compares what we have as against the competition. We don't get this from anybody in Defense Department to the best of my knowledge; nor from any other source.

Chairman STENNIS. Thank you very much, Senator. I made my remarks about the history of the legislation because I thought anyone reading the record, it would be well to have it spelled out there.

COMMITTEE RECESS

Gentlemen, we thank you very much. We will ask you to be back at 2:30 and hope that is convenient to you.

Secretary Chaffee. Thank you.

(Whereupon, at 12:40 p.m., the committee was recessed, to reconvene at 2:30 p.m. of the same day.)

(Afternoon session, 2:40 O'clock, Tuesday, March 17)

Present: Senators Stennis (chairman), Symington, Cannon, Smith

of Maine, and Schweiker.

On the staff of the Committee on Armed Services: T. Edward Braswell, Jr., chief of staff; and Labre R. Garcia, professional staff member.

Of the staff of the Preparedness Investigating Subcommittee: James T. Kendall, chief counsel; Ben Gilleas, director of investigations; Ed Kenney, Don L. Lynch, David A. Littleton, and George Foster, professional staff members.

DEPARTMENT OF THE NAVY

STATEMENT OF HON. JOHN H. CHAFEE, SECRETARY OF THE NAVY, ACCOMPANIED BY ADM. THOMAS H. MOORER. CHIEF OF NAVAL OPERATIONS, AND GEN. LEONARD F. CHAPMAN, JR., U.S. MARINE CORPS. COMMANDANT OF THE MARINE CORPS—Resumed

ESTIMATION OF CARRIER DELIVERY

Chairman Stennis. Gentlemen, I have some questions here about the carrier. Now, Secretary Laird said there was a possible 1-year slip in the CVAN 68 and CVAN 69 because of delays in delivery of nuclear components.

I didn't know that anything like that happened in Admiral Rickover's department. What is your current estimate now, gentlemen, on delivery of these components and the ships, too? When are you expect-

ing them now? CVAN 68 and then CVAN 69.

Secretary Chaffee. Mr. Chairman, his estimate of the CVAN 68 being delayed a year seems a little long to me. I just don't have that information right at my fingertips.

Chairman STENNIS. All right. If any of the others have that for you, they can speak up. The main thing now is when do you expect

delivery of the CVAN?

Secretary Chaffee. Taking the CVAN 68, that is, the Nimitz, the best information we have is that it may be delayed from 1972 to 1973 because of nuclear component production problems. As I recall that situation, it isn't so much a delay on Admiral Rickover's part. It is problems with the production of the nuclear components.

Chairman Stennis. Well, I was saying that partly in jest about the

Admiral.

Secretary Chafee. As for the next carrier, the CVAN 69, which is to be named the Eisenhower, delivery is planned for March of 1974. However, again the component problem and the effects of the CVAN 68 being delayed, that is, the Nimitz being delayed, may delay the Eisenhower, too.

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Chairman Stennis. All right. Anyway, just 1 year slippage.

Secretary Chafee. Yes, sir.

Chairman STENNIS. In each one of them.

Secretary Chaffe. I am not sure that that would be 12 months. It would be in a different calendar year but I am not sure it would be 12 months.

Chairman Stennis. Now, Mr. Laird also spoke of a target end-cost for CVAN 70 for \$640 million and you are budgeting only a small amount, only \$500 million for CVAN 68 and CVAN 69.

Now, is this a realistic estimate of their cost as of now? This \$500

million for the CVAN 68 and CVAN 69?

Secretary Chaffe. The budgeted cost for the CVAN 68 is \$536 million. That is the first one. Presently we are negotiating with Newport News on a price and we expect to have the price by the time we submit the next SAR to you. That would apply both to the Nimitz and to the Eisenhower.

Admiral Rickover was very adamant that we shouldn't come forward with a firm price at this time feeling that it might affect our negotiations with Newport News. In other words, if we came up and said we think it is going to be X dollars, then the way these negotiations seem to work is they find out about it and that becomes the base price.

Chairman Stennis. Under your contract you don't have that end

price.

Secretary Chaffe. No. sir.

Chairman Stennis. All right. You don't have that fixed price.

Now, back to the Nimitz a minute, this 1973 delivery, you say it may not be a year but you mean it will be approximately a year. Is that what you mean?

Secretary Chafee. Well-

Chairman Stennis. A late year.

Secretary Charge. That is what I mean. In other words, originally the delivery was in 1972. I believe it was June of 1972. Now they talk of 1973. That could be January or it could, of course, be way late in 1973. But these are calendar years rather than months' slippage. That is the point I was trying to make. I will file additional information for the record.

(The information follows:)

In mid-1964 the Secretary of Defense authorized development of a two-reactor nuclear propulsion plant suitable for nuclear powered attack carriers, the first of which was to be included in the 1967 shipbuilding program. It was recognized at the outset that the transition from the eight-reactor plant with a 3-year reactor core life then installed in the Enterprise to a two-reactor plant with a 13-year reactor core life would be a major technological advance. It was also recognized that the first-of-a-kind equipments needed for the two-reactor plant would be the largest ever manufactured for the Naval Nuclear Propulsion

Because the long leadtime required to procure these new-design, large components controls the ship construction schedule, the Navy in the fall of 1964 requested that advance procurement funds be provided in the FY 1966 budget for the FY 1967 carrier—the Nimitz, CVAN-68. However, the Department of Defense did not accept this request on the basis that all funds for the CVAN-68 should be included in the fiscal year 1967 shipbuilding program. Initial shipbuilding funds for the CVAN-68 were made available to the Navy in July 1966.

Due to the difficulty encountered in obtaining adequate vendor support to manufacture the nuclear propulsion plant components on a schedule supporting the Nimitz construction schedule, the Navy in 1967 obtained approval to assign the highest industrial priority to the Nimitz propulsion plant. This propulsion plant is being procured on a very tight schedule through four prime contractors,

about fifty major suppliers and over one-thousand sub-tier contractors.

Procurement of nuclear propulsion plant equipment for the Nimitz is now well into the production phase. Some nuclear components have been delivered. Many of the large nuclear propulsion plant components will be installed in the Nimitz this year; the remainder are expected to be delivered over the next two years. However, solution of development and production problems including labor strikes in several factories has delayed some components so that completion of the Nimitz may be extended from 1972 to 1973.

Nuclear propulsion plant components for the second carrier of the class, the Eisenhower, will come off production lines right after components for the Nimitz and will therefore be in time to support the construction schedule for the second ship. However, since the two ships are being constructed in series in the same shippard and have to use the same limited drydock and pierside facilities, delay in the Nimitz could also cause some delay in completion of the second ship. The Navy is working with the shipbuilder to arrange the shipbuilding schedules so as to build both ships at minimum cost. The possible increase in costs due to the potential delays is not known at this time.

END COST FIGURE

Chairman Stennis. This \$640 million, then, for CVAN 70, as of now

you think that is rather a firm end cost figure.

Secretary Chaffee. I am always leery, Mr. Chairman, talking of firm end-costs when we haven't completed our negotiations for the first two. That might give us a better idea. But these are the figures. The \$640 million, of course, is considerably above the \$510 million for the second one and with some guarded optimism, I would say that is the way it looks now.

Chairman Stennis. Well, when this comes up for debate, we are going to be asked a lot of questions along this line. When do you expect

to get these figures on the CVAN-68?

Secretary Chafee. We would hope to have them in late April or in

Chairman Stennis. Well, at that time you will be free to let us have them, right?

Secretary Chafee. Oh, yes, sir. We surely will.

Chairman Stennis. All right. We want you to do that and it will not be classified.

Secretary Charge. Not for you, no.

Chairman Stennis. According to your future negotiations on the other one.

Secretary Chaffee. I don't believe so.

Chairman Stennis. There comes a time when you have to come out with it, I think, just like the cost of the war. I don't think we ought to try to conceal that.

Secretary Chafee. Yes. I don't see who it would be secret from because Newport News would certainly know the price to which they

agreed. We would certainly be free to-

Chairman Stennis. Well, I said conceal. You know the current rate of the cost of the war has been classified in a letter to me but I thought maybe the Secretary was just joking about that because I don't think it ought to be classified. They know more about how fast we are withdrawing troops over there than we do.

All right. Going on to this other matter now, you are still hoping now for this CVAN-70, \$640 million, as a rather firm figure, correct?

Secretary Charge. Yes, sir. I will supply a statement for the record.

(The information follows:)

The Navy expects negotiations to be completed this spring which will establish target and ceiling prices for the Nimitz and Eisenhower.

The Navy anticipates that the target prices for the two ships will fall within the amount allowed for the shipbuilding contract in the budget estimates. If the Navy is not successful in negotiating target prices within the present budget estimate, the budget estimate will have to be revised at that time.

However, even when negotiations are completed and the contract terms and pricing arrangements are settled the Navy will still not be able to predict the ultimate end cost with accuracy until actual ship construction is considerably advanced. This is so because there are many uncertainties involved in constructing these complex warships, and it is not possible to know in advance exactly how much effort will be required to build them. It is for these reasons that a fixed price incentive fee type contract is used for this type of work. This type contract contains an incentive sharing arrangement where the Government pays a large part of the cost, should they exceed the target cost. Therefore, the Navy's liability under this type contract may exceed the target prices.

Further, the Navy has no control over changes in market prices for labor and materials. If the changes in market prices (inflation) are different from what the Navy has been permitted to budget, then the costs of ships will change accordingly. The present budget estimates for the Nimitz and Eisenhower are based on FY 1967 shipbuilding labor rates and material prices in effect when the Nimitz Class was started and include a reserve for escalation based on the Shipbuilding and Conversion, Navy (SCN) escalation budget formula which applies to all ships. This budget formula has for the last several years restricted the escalation reserve in all Navy ship budget estimates to 7.5 percent of the estimated shipbuilding contract price. Budget estimates for ships planned for the FY 1971 and FY 1972 programs include an escalation reserve based on 10% of the estimated shipbuilder's contract price.

The budget estimate of \$640M for the CVAN-70 is based on shipbuilder labor rates and material costs currently estimated for FY 1972 and also contains an escalation reserve of 10% of the estimated shipbuilding contract price.

REVISION OF NUCLEAR COMPONENTS DELIVERY TIME TABLE

Chairman STENNIS. All right. Now this question is going to come up. If late delivery of nuclear components is occurring already, why can't you wait until fiscal year 1972 for advanced funding of CVAN-70 without significantly affecting the schedule? You see, with your schedule now 1973, 1974, this point is going to be raised and I raised it myself now.

Secretary Chaffe. Mr. Chairman, I think the best argument for us there and a true argument is that, as we get the funds, we can commit them to nuclear component vendors and the other people who are supplying us the components. They then can continue their production line. However if there is a gap, if they finish up, they are left in an indefinite status as to whether they will get the other funds and might well dismantle their line or let some of their people go—divert them to the backlog of private power company orders for nuclear components. That is what causes a gap in our line.

Chairman Stennis. That is part of your system of keeping the wheels turning.

Secretary Chaffee. Yes, sir. That was, of course, an objective of the three-carrier buy.

Admiral Moorer. Mr. Chairman, the nuclear component vendors have established special production facilities to manufacture these components and they have assembled staffs of specially trained people for this purpose because the *Nimitz* class nuclear propulsion plants use by far the largest nuclear components ever assembled for naval use. The objective is to maintain continuity. Otherwise the vendors will

assign the equipment and the workers to other orders. Then in order to reactivate and start again, it would be extremely expensive.

Chairman Stennis. Well, Admiral, now, is that correct? Since you

already are 1 year behind? Admiral Moore. Yes, sir.

Chairman Stennis. It has already slipped a year.

Admiral Moorer. Yes, sir, but as you may recall, Senator, the Navy wanted to start on the CVAN-70 last year, so it has been held up a year in starting already. The idea would be again to maintain continuity on the part of these people that are making the major nuclear components to keep from having a break in the workload. Please remember that we started ordering the nuclear components for the *Eisenhower* in July 1967. With fiscal year 1971 funds, we won't be able to start ordering the CVAN-70 nuclear components until three years later.

Chairman Stennis. Well, it seems to me you ought to include the idea that if you don't start something on CVAN-70 that you would have a break. You are finishing up both of them here during the

next year, reaching the final stages, aren't you?

Admiral Moorer. Yes, sir, nuclear components for both the Nimitz and Eisenhower and well along in fabrication. But as I understand it, and I am sure Admiral Rickover can explain this far better than I, the initial effort to build these tremendous nuclear components, for the reactor plant did not result in completion of the work in the previous estimated schedule, so therefore the whole workload was moved down calendarwise. The whole objective is not to generate a break in the production lines for the third ship. In other words, we are experiencing proof that we must order the nuclear components in advance of the ship authorization if we are to get them on time. You may remember, Senator, that the Nimitz was authorized without long lead funding the year before.

Chairman Stennis. You mean that was something that wrapped up

these nuclear components that caused the delay?

Admiral Moorer. Yes, sir. It is a tremendous job to fabricate these components. As I understand it, these nuclear components require some of the largest forgings that have ever been made. Unlike the *Enterprise* which has eight reactors, this ship has only two reactors and has the equivalent power. Further, the initial reaction core life has been increased from about 4 years in *Enterprise* to 13 years in *Nimitz*. So this is quite an advance in technology and in design.

Chairman Stennis. Well, Secretary Laird said here that with two points, one was that he was only going to ask for \$5 million for the——

Secretary Chaffee. I think that is an expenditure. Chairman Stennis. Going to spend only \$5 million.

Secretary Chaffe. Yes, sir, that is correct. In fiscal year 1971, whereas we are asking for \$152 million authorization, we expect to spend only \$5 million. But again it comes back to being able to give the vendors firm orders so they have some certainty as to what we are going to do. We need to place these orders this year to keep the vendor capacity committed to this work. The \$152 million will be expended over a period of about 4 years with a small expenditure of about \$5 million in the year of order placement. If we don't get the \$152 million authorized in fiscal year 1971, it could well be that instead of having the

go-ahead, say, in June of 1970, that we wouldn't have the go-ahead until October or November of 1971.

Chairman Stennis. That is for matters beyond the \$5 million you

are talking about?

Secretary Chaffe. No, the whole \$152 million, which includes the \$5 million. If we didn't ask for it in the 1971 budget. If we slipped it to the 1972 budget. I will supply additional information for the record.

(The information follows:)

If the Congress approves the Department of Defense FY 1971 budget request for \$152 million advance procurement funds for the CVAN-70 and fully funds that carrier in FY 1972, it is expected to be delivered to the Fleet in 1977, even considering possible delays in the first two ships. If the advance funding were deferred, the delay in delivery of the long lead time components would delay

ship delivery.

Further, it is necessary to proceed with advance procurement for the CVAN-70 in FY 1971 as presently planned to avoid having to shut down the special Nimitz class nuclear component production lines. Such a shutdown would significantly increase the cost of the CVAN-70, if it were decided to postpone building the ship to a later date. In this regard it should be noted that procurement of long leadtime nuclear components for the Eisenhower was started three years before FY 1971 funds will be available to start procurement of long leadtime nuclear components for the CVAN-70.

In summary, if advance procurement funds are not provided in FY 1971 for

long leadtime nuclear propulsion plant components for the CVAN-70,

a. the CVAN-70 will be delayed at least another year,
 b. nuclear component production lines will be disrupted,

c. the gap in construction between the *Bisenhower* and the CVAN-70 will be widened which will further decrease the shipbuilder's efficiency in constructing these ships and

d. the total span of the Nimitz class carrier program will be lengthened which carries with it significant costs in the shipbuilder's, contractor's, laboratories'

and government organizations.

In short, further delay in starting the CVAN-70 would significantly increase its cost above the present budget figure for the FY 1972 program of \$640M.

EXECUTIVE REVIEW

Chairman Stennis. All right. Well, we will move on here to this related point. Mr. Laird testified over in the House, and I think he said it over here, too, that this CVAN-70 has not yet received specific approval from the National Security Council.

Now, when is this executive review going to be concluded and when are we going to know what they really recommend? We will have to have something definite from them as a practical matter before this

bill is written up.

Secretary Charge. I will relay that message to him, Mr. Chairman, that you would like a go-ahead from them before you consider it. Is

that—

Chairman STENNIS. Well, as a practical matter, yes. We will have to, because we will be going up to the floor with an item here that we wouldn't know what the executive branch of the Government, the Security Council was going to do about it. I think it just comes down to the nub of it, that you have got to ask for a thing before you expect to get it in the present atmosphere.

Secretary Chaffe. Yes, sir. I will convey that message to them.

Chairman STENNIS. Yes, I wish you would.

Secretary Chaffe. I certainly will.

Admiral Moorer. Mr. Chairman, I think the National Security Council would be more apt to treat with force levels rather than a modernization item such as we consider this ship to be. Certainly this comes within the purview of the Secretary of Defense and I think he perhaps is the only one that can answer this question.

(The information follows:)

CVAN-70 is required to maintain the modernity and capability of the carrier force regardless of any force level decision on the alternatives currently under consideration by the Administration. In fact, the *Nimitz* class carriers become even more vital if the Navy is required to operate a smaller carrier force. If a reduction in force level is made, it should be done by retiring older carriers in the fleet; six of the Navy's fifteen attack carriers were launched during or

shortly after World War II.

When it joins the fleet in 1977, the CVAN-70 will replace an aging, obsolescent World War II design carrier. The four Essew class carriers now serving in the active attack carrier role cannot today operate the most modern fighter (F-4), attack (A-6), reconnaissance (RA5C) or surveillance (E2) aircraft, and there is no growth factor left for further conversion or modernization. The air wings that the Essex class would be able to operate in the mid-seventies would be unable to survive against the contemporary Soviet arms technology, which we can expect to be in the hands of Soviet satellites as well as the USSR. The limitations of size, age and aviation facilities available in the Midway class will make these 30 year old ships less than one third as capable as the Nimitz class even without taking into account the advantage of nuclear propulsion.

The principal advantages afforded by nuclear propulsion to surface warships derive from their ability to steam at high speed for unlimited distances without refueling. In the carrier, there are important additional benefits. Because the nuclear carrier does not have to carry black oil for propulsion, there is more room in the ship's hull for aviation fuel and other combat consumables. This gives the nuclear carrier greatly increased combat staying power compared to its

conventional counterpart.

These two qualities give the CVAN a capability unmatched by any other

tactical air system, sea-based or land-based. This is the ability to:

Respond immediately to a contingency beyond the range of emplaced U.S. forces without waiting for supporting units or the prepositioning of logistic support.

Conduct combat operations while approaching the objective area.

Continue combat operations without support or replenishment for the

period of time required to establish sea-based logistic support lines.

To keep the attack carrier force modern a continuing infusion of new ships is required. Within a fifteen attack carrier force level, for example, the construction of a new carrier every other year means that attack carriers will reach an age of 30 years before they are replaced—the nominal maximum useful life of a carrier. Even with a force level as low as 12, it would be necessary to build a new carrier every 2½ years to replace the carriers when they become 30 years old.

The three Nimitz class carriers, CVAN-68, CVAN-69 and CVAN-70, are the only carriers authorized or currently approved by the Department of Defense from fiscal year 1964 through 1975, a period of 12 years; this will average out

to but one new carrier every 4 years.

MBT-70 USE BY MARINE CORPS

Chairman STENNIS. I will take that up with the committee just to be certain that I am speaking for their feelings, but I think just like this much lesser item, the Main Battle Tank, we are going to have to have a definite answer on this from the executive branch before we put it in the bill.

General Chapman, I meant to ask you this morning, the Marines are

still using the M-48 tank, aren't they?

General Chapman. Yes, sir. The M-48 and the M-103, the heavy tanks. We have had them for some years now and they are good tanks and we like them.



Chairman Stennis. You are familiar, of course, with the Main Battle Tank.

General Chapman. Yes, sir.

Chairman Stennis. You know that Deputy Secretary Packard has reported to us about dividing the contract with Germany. Do you share the Army's request or will this fit your future requirements?

General Chapman. No, sir. We haven't made a decision yet to go for the Main Battle Tank for the Marine Corps. The M-48, the modernized M-48 and the modernized M-103 I think are better tanks for our purposes which in some respects are different from those of the Army. So we have decided not at this point to ask for the Main Battle Tank for the Marine Corps. We are going to stick with the medium and heavy tanks that we have now.

Chairman Stennis. Of course, the tanks that you use are the ones

that you take with you. Is that right?
General Chapman. Yes, sir. That is right, sir. We use tanks primarily to support the infantry, not to fight enemy tanks. In fighting enemy tanks we will rely on our attack aircraft, on our long-range artillery, naval gunfire, and if enemy tanks then get within range of our infantry, we will rely primarily on the heavy tank which is the best tank killer in the world to combat the enemy attacks. We don't employ them primarily for antitank purposes and that is why we like the 48 and the 103 for our purposes. And we intend to hang onto them as long as we can.

Chairman Stennis. Is the 103 that you talk about the same as the

M-60 ?

General Chapman. No, sir. The 103 is a 120 mm. gun tank that is about the same age as the M-48, and it has many of the same components, same engine, rangefinder. It is a bigger and heavier hull but the silhouette is the same. But it has a 120 mm. gun and it will bust any tank in the world. Only the Marine Corps has that tank.

Chairman Stennis. All right. Senator Smith? Senator Smith. Thank you, Mr. Chairman.

PORT OF CALL CLEARANCE

Mr. Secretary, this morning I asked about the Mediterranean countries that permitted shore visits and you listed three that are always readys to receive us and some others that weren't always ready but eventually could be so.

Do you have to go through the State Department to get permission

to go into those countries when they refuse the first time?

Secretary Chaffe. We go through the State Department, the local Ambassador anyway, the first time. For instance, in Turkey, we talk to the American Ambassador. We talk to the American Ambassador in Yugoslavia. In other countries, Spain, Italy and Greece for instance, we have much simpler arrangements. I know that in Greece we usually don't go through the Ambassador. We have a much more informal setup in certain of these countries.

Senator SMITH. But in those places that you can't go in without a lot of redtape, isn't that detrimental to the service? What do you do when a ship needs repairs and you have to get into a place immediately? Do you go into one of those that is easy to get into or do you repair it at sea or do you take the time, and how much time,

to get into the places you want to go to?

Secretary CHAPEE. Well, visits to these countries are not primarily for repair. I mean repair is really a minor function. They are for recreation and relaxation for our crews and also a chance to show that the United States is around in those areas. But primarily it is for our people. So that as far as repairs go, that is really not a factor of any consideration.

If it came to an emergency involving one of our ships, I am sure that they would be able to get into these places.

DOCKING PROCEDURE AND TIME

Senator SMITH. How long does it take to go through the regular redtape to get into one of those places that is not so easy to get into? What I am trying to get is the time.

Secretary Chaffe. Well, of course, it varies. For instance, getting into Yugoslavia is much more complicated, or even Turkey under the present circumstances, than, say, Malta. Admiral Moorer, do you

know how long it takes to get into, say, Turkey?

Admiral Moorer. This depends quite a bit on whether or not they are about to have an election and what the political situation is at the moment. But let us say that it will take us 6 weeks or so to initiate the negotiations and the discussions and finally get clearance, Senator Smith.

Senator Smith. Has it always been that way, Admiral?

Admiral Moorer. Yes, Senator. In certain places it has been that way. Of course in the past we have had freer access to Algeria and places like Lebanon which we don't visit now, but there have always been a certain number of countries where we had to negotiate very delicately in order to arrange a visit to make certain it wouldn't conflict with some state visitor from some other country and things of that kind.

(The information follows:)

To expand on the subject of ship visits and procedures for arranging them, visits are made to Spain, Italy, Greece, France, and Malta on a routine basis. These visits are arranged by the US Naval Attache in the country concerned upon receipt of requests from Commander, Sixth Fleet. In the interests of orderly planning, requests are normally made a month or more in advance.

In cases involving countries where port clearance must be arranged through the Department of State and the Ambassador, requests are also entered a month or more before the desired visit dates. The time needed to obtain clearance varies from several days to several weeks, depending upon the speed with which the

country responds to our request.

In the event of an emergency, it would be expected that clearance for a ship to enter port could be obtained expeditiously whether arrangements could be handled by the Attache or the assistance of the Department of State was required.

As visits are planned and requested well in advance and as they can be arranged quickly in emergency situations, the administrative time required to obtain clearance presents no significant problem.

ATTACK CARRIER REDUCTION

Senator SMITH. Admiral, in the active fleet ship reduction of 175, I think it was, how many were attack carriers?

Admiral Moorer. There were no attack carriers in the reductions I mentioned. At the peak of the Vietnam activities in 1968, just before the bombing was terminated, we were using 17, one of which was an ASW carrier that was temporarily converted for use as an attack carrier. Today we have 16, one of which, the Shangri La, is an ASW carrier temporarily acting as an attack carrier.

This reduction was made when we reduced the number of carriers maintained on the line, as we say, in the western Pacific from five to four. We have maintained two in the Mediterranean for many, many years, and in an effort to more or less equalize the exposure time so far as the pilots are concerned, we in effect pool all the carriers and let

each of them take its turn on the line in Vietnam.

SOVIET-UNITED STATES MEDITERRANEAN SHORE FACILITIES COMPARISON

Senator SMITH. Admiral, would you give the committee something on a comparison of United States and Soviet Union as to their shore facilities in the Mediterranean?

Admiral Moorer. Yes, Senator. Do you want me to do that now? Senator Smith. If you can briefly, and then make a more elaborate

statement for the hearing record.

Admiral Moorer. Yes, I will, Senator Smith. The general procedure used by the Soviets is to anchor in offshore areas, for instance, off Tunisia in the Gulf of Salum and Kathira, off the Greek coast, and do most of their repair work from tenders. On occasion they will also perform repair work in port at Alexandria. Sometimes they visit Yugoslavia. I understand they are planning to visit Malta in the future on occasion. To answer your question specifically, I think we have about the same procedure in the sense that both the 6th Fleet and the Soviet squadron maintain their ships and effect repairs by using tenders.

Now, in circumstances wherein we have a necessity to enter a drydock, we have had access in the past to the docking facilities in

Gibraltar and also the French docking facilities in Toulon.

The Soviets use facilities in Alexandria where they also have access to two floating drydocks which they supplied the UAR. Of course, you must realize they are not very far from home. I mean they can go right through the Dardanelles and be right back into Sevastapol again. But the concept used for maintenance by both the 6th Fleet and the Soviets is similar and that is not to have a large base ashore but rather to provide maintenance from mobile facilities.

As you know, Senator Smith, with the exception of the flagship, we do not have the families of the men in the 6th Fleet living overseas. So we do not have any large bases any place in the Mediterranean. We depend on our allies for such facilities as we must have that are

shore based.

(The information follows:)

Since the June war the Soviets have concluded a number of "facilities arrangements" with Egypt which permit the Soviet naval squadron to make regular use of repair facilities, including two floating drydocks, and particularly the El Qabbari shipyard in Alexandria. The Soviet squadron maintains storage facilities in Alexandria and Port Said. In addition, the Soviet squadron maintains on stataion in Alexandria several auxiliary ships, on a continuous basis, in order to service and repair surface combatants and submarines. With the exception of

two occasions, the Soviet naval squadron has not had access anywhere else in the Mediterranean Basin to facilities similar to those enjoyed in Egypt. The Soviets undoubtedly wish to gain access to naval facilities in the Mediterranean, particularly at Mers-el-kebir in Algeria. Malta has allowed several Soviet merchant vessels to utilize its drydock facilities, but has denied repeated Soviet requests for fleet visits. [Deleted.] It should be pointed out, however, that much of the repair and maintenance of ships is accomplished by Soviet tenders in international waters.

For purposes of refueling and resupply, the Soviet naval squadron relies on 12 anchorages (mostly in international waters) and on storage facilities available in Alexandria and Port Said.

FUTURE OF CARRIERS

Senator SMITH. Would you comment on the survivability of carriers in the next decade with the STYX and KITCHEN, and so on, for coming into being?

Admiral Moorer. Yes, Senator. I will be happy to.

In the first place, the STYX, of course, is the missile that got so much attention because it sank the Israeli destroyer, *Elath*. But it is a

short range weapon and is mounted on a PT boat.

We would not expect to bring our carriers within range of this type of weapon system. This is more of a coastal defense system and not one we would expect to encounter in our offshore carrier operating areas.

However, the carriers are, of course, subject to attack by both surface-to-surface missiles fired from destroyers as well as submarines, and in addition from air-to-surface missiles fired from large bomber aircraft. When one talks about vulnerability, one must, I think, differentiate between nuclear weapons and nonnuclear weapons.

So I am talking right now in terms of nonnuclear weapons because once we move into the use of nuclear weapons, then we are in a new ballgame, so to speak. We would be in a very major confrontation

between the United States and Russia.

So speaking in terms of the threat posed by nonnuclear weapons, the first defense that we depend upon, of course, is the aircraft from the carriers. They would search out and destroy the surface ships. We wouldn't expect a known enemy's surface ship to be allowed to come within its missile range of the carrier under wartime conditions.

The submarine is another and more difficult problem. But any of the platforms—either the submarine or destroyer type or cruiser type, that fire a surface-to-surface missile from long range—must have in the immediate vicinity of the target some external assistance such as an aircraft, ship, submarine, or other means to indicate the approximate location of the target. So, of course, we would work on the submarine or the aircraft that supplies this information to the firing ship. In addition to that, we have developed several means of detecting the fact that the missile is in the air and for deceiving the missile once it is airborne by providing false targets or jamming it actively. Then, of course, the final effort is directed toward destroying it in the air, either by point defense missiles, our own missiles from the ships, or by air-to-air missiles from our aircraft.

So, Senator Smith, you go through these three steps. The first is to detect the fact that the missile is in the air after having made every effort to destroy any platform that could fire the missiles. Second, having detected it, the next step is to attempt to deceive it electronically by

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giving false targets or by jamming its own homing system. And thirdly, if in fact it survives and comes within proximity of the ship, to de-

stroy the missile in the air before it strikes its target.

Now, let's say you fail in all of these measures and you do in fact get hit, and we are talking in terms of nonnuclear weapons. Well, the carrier is a very tough ship. For instance, I recall during World War II the Saratoga, the old one, got hit by eight Kamikazes and continued on. Let me assure you that one or two missiles are not going to completely inactivate the carrier so that it cannot continue in operation. Two or three torpedoes or two or three missiles of that type, even four or five 500 pound bombs will not permanently disable it. As we demonstrated during World War II over and over again, these ships can continue to operate after they have been hit.

For instance, the *Enterprise* was hit down south at the Battle of Santa Cruz and then immediately went up to participate in the Bat-

tle of Midway.

So the thought that if just one missile hits the carrier it will immediately dissappear is certainly a false one.

Senator Smith. You are not concerned about the next 10 years be-

cause of the missiles?

Admiral Moorer. I am not. I certainly don't accept the allegations that the carrier is vulnerable to the degree that often has been mentioned. I can simply say this, that if the carrier with all of its electronic support and its fighter aircraft and its sophisticated equipment is vulnerable, then every surface ship is vulnerable and we might as well get off the ocean, because we could not ship anything to Europe or any place else. I don't believe surface ships are vulnerable. I believe in the next war we will perhaps suffer greater losses than we have in the past, but I am confident that we can stay out there and operate. We intend to do just that.

(The information follows:)

ATTACK CARRIER SURVIVABILITY

The effectiveness with which the attack carrier in the future will be able to carry out its functions is certainly affected by the carrier's survivability in the projected environment. But survivability is not an absolute quality. No weapon system is either completely survivable, or completely vuinerable. Carrier survivability must be examined in context considering the carrier's mission, the most probable types of conflicts in which it will be employed, the forces it will encounter in those conflicts, and the weapons which will be used against the carrier.

1. THE SPECTRUM OF WARFARE

The attack carrier is useful across the spectrum of warfare. This spectrum ranges from total peace, progressing through cold war, sub-limited wars, limited wars, major conventional wars to general nuclear warfare.

2. MOST PROBABLE FUTURE CONFLICTS

In this nuclear age the greatest probability of future conflict lies in the center of the spectrum. It is doubtful if any major power will ever be able to engage in more than one nuclear war. Since WWII the United States has been involved in nine crucial international confrontations and many lesser crises. So it is reasonable to presume that this pattern of international affairs will extend into the immediate future. In the next thirty years, the U.S. can expect to be involved mostly in conflicts below the threshold of general nuclear war. This is the environment to which the attack carrier will most probably be exposed. On the basis of a projection of past experience in this environment into the

future, attack carrier survivability appears to be good, especially when compared to other air weapons systems. In WW II, no modern U.S. attack carrier (Essex class or subsequent) was ever sunk. In the two wars and many crises since WW II, no U.S. Navy carrier has ever been damaged by enemy action. Yet the carriers were where the action was. All but two of the attack carriers currently in the fleet have been involved in combat operations. In contrast, all of the tactical air bases in South Korea were overrun by enemy ground forces in the Korean War. Some, with their stocks of ammunition and aircraft fuel were captured a second time by Chinese communists. In South Vietnam, 383 helicopter and fixed wing aircraft have been destroyed on airfields, and 3,616 more damaged by enemy ground attacks as of 1 January 1970.

3. FUTURE WEAPON THREATS

a. Aircraft.—The threat to attack carriers from aircraft is primarily from large long-range bombers. However only about [deleted] of the total Soviet block aircraft inventory has a radius of action of more than 600 miles. The carriers' ability to maintain a standoff distance limits the effectiveness of shorter ranged tactical aircraft. The use of large aircraft in bombing attacks against carriers is not a high threat because of their extreme vulnerability and low accuracy in a high altitude bombing attack against a maneuvering target. The air-launched standoff anti-ship missile is the most dangerous air threat to carriers.

b. Surface Ships.—Because of the limited range of the surface ships' guns in comparison to the much greater radius of action of a carrier's aircraft for surveillance and attack, gunfire is not considered to be a real threat to carriers. The anti-ship missile launched from a surface ship greatly increases range and accuracy of the attack, and therefore constitutes the prime threat to the

carrier from surface ships.

c. Submarines.—Submarines are a threat to U.S. carrier forces because of their potential for approaching undetected to within weapon range. Nuclear powered submarines, because of their high submerged speed and ability to travel great distances without surfacing, are much more effective in penetrating anti-submarine defenses than diesel submarines. Submarines may employ either torpedoes or guided missiles in the attack. Torpedo attack is probably the lesser threat. The submarine must reach a point within several miles of the carrier to fire torpedoes. Furthermore, the torpedo protective system of modern attack carriers is extremely effective. Recent technical analyses of the Naval Ship Research and Development Center show that on the average, [deleted] torpedoes or more are required to put a modern Forrestal or subsequent class carrier out of action. Submarines capable of launching anti-ship cruiser missiles do, however, constitute the primary threat to any surface ship.

d. Ballistic missiles.—Against ICBM attack, the aircraft carrier, in contrast to cities, industrial complexes, land air bases, ports, missile sites and similar fixed targets, is virtually immune to pre-targeting. It can move twelve miles or more during the time of flight of an ICBM. If its position is precisely known at a given time, three hours later the carrier is somewhere in the area of a

circle of more than 25,000 square miles.

e. Nuclear warheads.—(1) The use of nuclear warheads on ballistic or antiship missiles increases their kill probability enormously. A direct hit from a nuclear warhead will destroy any ship, and any other military installation as well. However, there is little chance that nuclear weapons would be employed against the U.S. carrier force except under circumstances of a general nuclear war with the Soviet Union or with China. Under these conditions, everything is vulnerable and great losses will be sustained by both sides. Even under these conditions the carrier is less vulnerable than fixed bases because it cannot be pre-targeted.

f. Principal threats to the carrier in order of severity are:

- (1) Submarines in general, but particularly nuclear submarines with cruise missiles.
 - (2) Long range bombers with cruise missiles.

(3) Cruise missile-equipped surface ships.

g. Secondary threats to the carrier:

(1) Tactical aircraft other than long range bombers. They may have insufficient radius of action (less than 600 miles) to reach the carrier at its operating range.

(2) Long range bombers in level flight bombing attacks. These are exceptionally vulnerable to missiles.

(3) Gun equipped ships. These are greatly outranged by the carrier's

aircraft.

(4) Ballistic missiles. Ships operating at sea cannot be pre-targeted for ballistic missile attack.

4. THREATS ENCOUNTERED IN LIMITED WARS

The most probable future wars will be limited ones, which means that the U.S. forces will encounter Soviet arms, but on a limited basis and in the hands of bloc forces other than the Soviets. It is useful therefore to determine what weapons would most probably be encountered in the forces confronted in future conflicts.

a. The preceding analysis of the weapon threat has shown that the most effective weapon against the attack carrier is the anti-ship missile, and that the nuclear powered submarine is the most effective launching platform. To determine then, what forces could mount a sustained threat against the carrier, it is necessary to analyze the orders of battle of potential limited war enemies.

(1) Nuclear powered attack submarines, cruise missile equipped:		
Communist China none Others none		
(2) Diesel powered attack submarines, cruise missile equipped:		
Communist China none Others none		
(3) Diesel powered attack submarines for torpedo attack (no cruise missile capability):		
Communist China [deleted] *UAR [deleted] *North Korea [deleted] *Albania [deleted]		
[Deleted.] (4) Long range aircraft (Badgers) capable of anti-ship missile delivery:		
Communist China [deleted] Iraq [deleted] UAR		

[Deleted.]

(5) Surface ships (and craft) equipped to deliver anti-ship missiles:

(3) Surface ships (and craft) equipped to deriver anti-ship missiles.				
Patrol boats (OSA and KOMAR)	Patrol boats (OSA and KOMAR)			
Communist China [deleted]	Yugoslavia [deleted]			
North Korea[deleted]	Cuba [deleted]			
East Germany [deleted]	UAR[deleted]			
Poland [deleted]	Algeria [deleted]			
Rumania [deleted]	Syria [deleted]			

5. PROBABLE FUTURE MISSILE THREATS TO CARRIERS

Because the most probable future wars will be below the threshold of general nuclear war, limited conflicts of the type experienced in Korea and Vietnam can be expected.

a. The technology of the anti-ship missile is the newest and most formidable weapon for future use against the carrier. However, under the most probable threat environment less than general war, the threat of the anti-ship missile is substantially diminished. There is small chance in the immediate future that the lesser potential enemies will have significant capability to deliver anti-ship missiles except in one-shot, isolated surprise attacks.

b. Although the Soviets are providing satellites with some modern weapons, they have not provided them with a submarine missile launching capability. Any significant surface launched missile capability requires control of the sea, which is not attainable by the lesser powers alone. The Soviet STYX missiles with which the Egyptians sank the *Elath* were [deleted] were fired from patrol boats [deleted]. Significantly, the Egyptians have not duplicated this feat.

c. It is possible that surface-to-surface missiles similar to the STYX missile could be provided to the North Vietnamese. However, the carriers in the Gulf of Tonkin can and have operated beyond the range of land-based STYX missiles.

and no potential North Vietnamese anti-ship missile launching platform such as a patrol boat or jet aircraft has ever penetrated the U.S. Naval defenses to within the effective missile range of our carriers.

d. The major anti-ship missile threat from nations supported by the USSR is not against aircraft carriers but against unprotected lesser ships operating

independently which may be taken by complete surprise. [Deleted.]

e. An air launched missile capability requires control of the air to penetrate to within launching range of carriers. The carrier provides its own air supremacy in the vicinity of its task force and out beyond air-to-surface missile range.

f. In summary, it is not enough for a nation simply to have an anti-ship missile launching capability, whether it be surface or air launching capability. It must also have a naval or air force capable of gaining local tactical superiority to permit its missile launching platforms to penetrate to within striking range of their seagoing targets. Against major targets, such as carriers, there must be a sustained attack capability—not a oneshot capability which a carrier can survive. In fact, as will be discussed below, the carrier with its embarked aircraft is the most powerful and toughest warship ever built—it is not an easy target to attack or damage severely.

6. CARRIER DEFENSE AGAINST ANTI-SHIP MISSILES

- a. The threat to the carrier is well recognized and improved defense measures are under development. Carrier exposure to guided missile attack is not new. In World War II, the Japanese launched 2,314 aircraft in kamikaze attacks against the U.S. Fleet, with carriers as the principal targets. Despite the fact that the kamikaze was a guided missile with the most sophisticated guidance system possible—the human brain—not a single attack carrier was sunk by them.
- (1) No attack carrier built during World War II or subsequently has been lost to enemy action. The Basea class fought through the aircraft (including kamikaze) attacks and submarine attacks of World War II to survive for subsequent use in Korea and even later in Vietnam in conjunction with the newer carrier classes.
- (2) Design improvements for protection have been incorporated in all new carriers built since World War II subsequent to the *Bssew* class. The new *Nimitz* class nuclear carriers are the best protected and least vulnerable carriers ever designed.
- (3) The available defenses against anti-ship missiles for a carrier task force now consist of the following:
 - (a) Inherent mobility (indefinite endurance at high speed for nuclear ships).
 - (b) Air attacks by carrier aircraft against:

Surveillance platforms

Launching platforms Missiles in flight

(c) Anti-submarine force attacks against hostile submarines.

(d) Surface-to-air missile (SAM) defenses in ships of the task force against anti-ship missiles.

(e) Close-in gun and missile defense from carriers against anti-ship missiles.

(f) Both active and passive electronic warfare countermeasures from aircraft and all ships in the task force.

b. In the event that anti-ship missiles penetrate the above defense in depth and close-in defenses, the carrier is well equipped to survive hits with its built-in protective systems as follows:

(1) Extensive armor protection for the flight deck, sides, and underwater body designed with high probability to defeat high order contact and penetrat-

ing explosives comparable to that of an anti-ship missile warhead.

(2) Watertight compartmentation throughout the hull which divides the ship into more than 2,000 watertight and shock resistant compartments to confine damage to small areas.

(3) Redundancy of essential systems for command and control, aircraft operations, ship control, ship propulsion, and damage control to provide means for continuing effective offensive and defensive action while limiting damage, defeating fires, and restoring casualties from hits.

(4) The effectiveness of the above design features was well illustrated by the accident in the Enterprise in 1969 when nine major caliber bombs (equivalent in weight of explosive to seven or eight anti-ship missiles) detonated on her flight deck. On that occasion, all essential systems were maintained in operable status, effective damage control contained the effects of fire, and the ship could have resumed her scheduled air operations within hours, as soon as the debris was cleared from the flight deck. It is not possible to demonstrate by simulation the toughness of our modern active carriers more effectively than was accomplished by this unfortunate accident.

7. ANTI-SHIP MISSILE DEFENSE PLAN

The Soviets have always been concerned with the threat posed them by our Attack Carrier Task Forces. In the 1960's they commenced allocating an increased share of their national resources on a priority basis to their anti-ship

missile program as a counter to the carrier threat.

Responding to this increased Soviet threat, the Navy embarked on a broad scale improvement of existing defensive weapons. Recognizing the need for central coordination, the ASMD (Anti-Ship Missile Defense) Office was established in February 1968 with a Rear Admiral USN as ASMD Program Coordinator. As the first priority, the ASMD office in 1969 published new tactics and doctrine for countering the anti-ship missile for fleet use. In that same year, an ASMD Program Plan was promulgated encompassing all previous missile defense plans and setting forth schedules for near term and future improvements to weapons and electronic warfare equipments.

The general provisions of the ASMD Program Plan provide a defense-in-depth concept utilizing all weapons available to a balanced fleet. The plan addresses immediate improvements to existing systems as well as installation of new systems, and integration of these systems into a reliable anti-missile capability in

both area and self-defense.

The near term effort includes installation of improvements to surveillance and reconnaissance platforms, air interceptors, surface-to-air missiles, guns, point defense systems, threat recognizers, decoy systems, radar detection systems, and counter-electronic warfare systems. New systems in the ASMD plan include an advanced surface-to-air missile system, an air and surface launched anti-ship missile, a manned shipboard multi-purpose helicopter, and a new radar controlled rapid fire machine gun.

The ASMD shipboard installations are time-phased in accordance with sched-

uled ship overhauls and availability of new or modified equipment.

The first step of the ASMD program, to equip 20 destroyers on an emergency basis for duty in Southeast Asia, is nearing completion. The second step, commencing July 1970, is to provide aircraft carriers, cruisers, and frigates with all available equipments necessary to provide a threat reactive anti-ship missile defensive suit.

NATO FORCES ABILITY

Senator Smith. Admiral, how long would you say the NATO forces could contain the Warsaw Pact forces in an all-out conventional war?

Admiral Moorer. Well, there have been many studies in this area, Senator Smith, and perhaps some of my Army colleagues could answer this better than I, but there is no question about the fact that the Soviets have us outnumbered in terms of divisions as well as tactical aircraft. [Deleted.]

Senator Smith. How long before we would have to resort to nuclear

Admiral Moorer. Well, that is a question that has been asked in the halls of the NATO councils ever since NATO was formed. Again I think there are so many variables here that it would take a bold man indeed to give you a specific answer to this in terms of days.

But, nevertheless, I think it would be, let us say, a [deleted]. Senator Smith. Mr. Chairman, my time may be up if you want to go ahead and I will come back.

Chairman Stennis. Thank you very much.

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RESERVE CUTBACK

Secretary Charge. Mr. Chairman, may I reply to a point Senator Smith raised this morning?

Chairman STENNIS. Yes.

Secretary Chaffee. Concerning the Reserve units and whether we had closed any beyond commuting distance, I indicated that I thought not with respect to the surface units. The five Naval Reserve airfields I mentioned are in a different category.

I checked and I find that the minimum distance is 6 miles and the maximum distance is 117 miles with the average distance about 38 miles. These are distances from the facility we closed to the alternate

facility.

In my statement I stated that some are beyond commuting distance. Regarding the Naval Reserve airfields, there is no question that they are beyond reasonable commuting distance.

Senator SMITH. Then that would be a hardship on reservists.

Secretary Chafee. Yes.

Senator Smith. And also would be serious as far as the Reserve

strength was concerned; would it not?

Secretary Chaffe. Well, what we are doing, as far as the Naval Air Reserve, is to provide for aerial pickups for these people. Now, some aren't going to want to do this, because of the length of time involved. For instance, if you fly them from Olathe down to Dallas, it takes some time. So we do anticipate as far as the Naval Air Reserves, we are going to lose some. With respect to surface reservists we might lose some, of course, but we don't think it is going to affect us to any degree. For the Air Reserves it isn't going to seriously affect us.

Senator Smith. Thank you, Mr. Secretary.

Chairman Stennis. Thank you, Senator.

Senator Cannon?

Senator Cannon. Thank you, Mr. Chairman.

EFFECT OF STRATEGY CHANGE ON NAVY

Mr. Secretary, and Admiral, I would like to ask each of you to comment on the effect that the change in U.S. strategy announced recently by Secretary Laird had or will have on the Navy; that is, the changing from a two and a half war capability to one and a half

capability.

Secretary Chaffee. I think, Senator, Mr. Laird has also stated that we really never had the two and a half capability. So, it will be a while for us to figure out what the effect of this will be on the Navy. I think probably a greater effect on the Navy will be the President's statement that the United States will remain a Pacific power but will depend more on the manpower of those countries involved to carry their own burden while we will assist in supply and matters like that.

Another factor that I believe will affect the future Navy is the changing environment overseas where there have been so many bases denied us or their use restricted.

Senator Cannon. Well, did the change in strategy affect your request for any weapons systems in the 1971 budget?

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Secretary Chafee. No. sir.

Senator Cannon. Made no change at all?

Admiral Moorer. Senator Cannon, the chairman has asked us already to answer your question in some detail for the record which we will do. Generally speaking, I pointed out this morning when you were absent that so far as the Navy is concerned, we cannot divide a war into areas. In other words, once we have become involved in a situation with a country the size of Soviet Russia, then by and large we are involved worldwide since they have a large Pacific fleet and pose a threat in that ocean as well as in the NATO area.

Senator Cannon. Well, now, how many attack carriers will you

need for a one and a half war strategy?

Admiral Moorer. Well, sir, again our planning is still in the transition stage. We feel that we need to maintain a force posture in the Mediterranean as well as in the western Pacific, particularly if we are going to rely more on air and sea forces in the latter area. To answer your question specifically, on a requirements basis this has been judged by the JCS to be at about the 16 level. We have 15 in this current budget. We do feel that we need a minimum of two in the Mediterranean and, as I say, three in the western Pacific, although at the moment we have four out there and have been maintaining four or five since February 1965.

So I think that the number is in the 15 or 16 category or area. If I may, I would like to detail the deviation of this force level in the

record.

(The information follows:)

ATTACK CARRIER FORCE REQUIREMENTS

1. Attack carrier force levels are determined by the Secretary of Defense based upon the requirements of the national strategy and in consideration of the capabilities of all of the services. Force levels are reviewed annually in a systematic, reiterative process. Based upon the agreed strategic concepts, the current and projected potential enemy threat, environmental factors, free world capabilities and probable contingency situations, the Commanders of the Unified and Specified Commands (CINCs) submit their wartime requirements to the Joint Chiefs of Staff (JCS). The JCS then evaluate the CINC requirements and recommend to SECDEF an objective force level. The ultimate force level decision, made by the SECDEF, is based upon consideration of all factors, including wartime requirements and peacetime budgetary constraints.

a. The primary mission of the attack carrier is in support of the principal function of the Navy: to gain, maintain, and exploit control of the seas. A collateral mission of the CVA is: to provide air support for other forces as required.

- b. In considering CVA force levels within the total military force structure. a direct trade-off between sea-based tactical air and land-based air is not possible because land-based air cannot be used:
 - (1) For control of the sea or overseas air lanes in mid-ocean areas.(2) For tactical air support of other forces where overseas bases are not
 - available within tactical air radius of the objective area.

 (3) Unless control of ocean and air access routes to overseas bases can be established and maintained to insure continued and sustained logistic support.

(4) Where forcible reentry to overseas areas is required.

c. There are a number of world-wide areas of high national interest where contingency plans must utilize attack carriers because of the limited availability of adequate land air bases.

(1) Southeast Asia. There is a current requirement for 2 CVA in SEASIA to support the war in Vietnam. For the immediate future this requirement is not expected to diminish. [Deleted.]

(2) Taiwan. On four previous occasions (1950, 1953, 1955, 1958) carriers were required to counter CHICOM threat to Taiwan.

(3) Korea. The base structure in South Korea is imadequate in size or quality to provide the required TACAIR capability to support U.S. and allied forces

[Deleted.]

(4) Mediterranean. The attack carriers in the SIXTH Fleet provide the only modern aircraft for the defense of Southern NATO. The loss of Wheelus AFB in Libya eliminated the last of the once extensive North African base complex. The tactical air capabilities of our NATO allies are substantially below that available on SIXTH Fleet carriers. NATO airfields cannot be depended upon for the support of U.S. aircraft in situations of unilateral U.S. interest, For example, in the event of U.S. involvement in UAR-Israeli confrontations, there are no land bases available in eastern Mediterranean which can be depended upon for planning purposes. A current commitment exists for 2 CVA in the Mediterranean.

(5) Caribbean. A campaign in the Caribbean area would require naval assault forces including carriers. For example, plans against Cuba in the 1962 missile

crisis included 8 carriers (3 CVA, 5 CVS).

(6) NATO. A NATO conflict is normally conceived of as a European war. This is true in the case of our NATO allies. However, a NATO war would most probably involve the USSR (as opposed to only the Warsaw Pact satellites). Russia's Pacific fleet would constitute a major threat to U.S. interests in the Pacific which include allies, foreign bases, as well as two overseas states (Hawaii and Alaska). Currently the Soviet Pacific Fleet includes [deleted] cruisers, [deleted] destroyers, [deleted] escorts, and [deleted] submarines of all classes.

2. The determination of the FY 1970 attack carrier force level is summarized

in the following:

a. The Commanders of the Unified and Specified Commands developed strategic and general purpose force requirements to meet the objectives of the national strategy within their geographical areas of responsibility. Taking into account the agreed strategic concepts, the current and projected potential enemy threat, environmental factors, free world capabilities, and probable contingency situations, the CINCs submitted to the JCS a requirement for a total of [deleted] CVAs.

b. The JCS evaluated the CINC force level requirement and concluded that up to [deleted] attack carrier air wings could be required and that CVA requirements were in a range of [deleted]. The JCS recommended to SECDEF an objective force level of [deleted] CVA/CVAN and [deleted] active attack carrier air wings.

c. The Secretary of Defense made the final decision after consideration of all factors, including budgetary constraints, that a force level of 15 CVAs in FY 1970 was sufficient to accomplish the objectives of the strategic concept with

an acceptable degree of risk.

3. The total objective carrier force level is determined upon the basis of wartime requirements, and the number of CVA out of that force level which can

be deployed depends upon the tactical military situation.

(1) Under mobilization conditions corresponding to an all-out declared war, with personnel frozen in assignments and essentially no budgetary restrictions, up to 90% of the carrier force can be maintained in a deployed status. In these circumstances when national survival is at stake, as in World War II, planned maintenance to conserve ships and equipment for long range future contingencies and the rotation of personnel to provide a normal family life become secondary factors. The cumulative effect of the continuing wear on men and material is accepted as the price of national survival.

(2) Without mobilization and with peacetime personnel policies and funding levels, about half of the attack carriers can be kept deployed in a surge effort when required. The effects of a surge effort are reflected in the gradual lowering of the material condition of the fleet and increasing personnel problems which

result from high tempo operations.

(3) Under peacetime funding and personnel policies and the associated operating conditions, about one-third of our carriers can be maintained in a steady state deployed status over an indefinite span of many years without a decline in fleet readiness due to reduced material condition or personnel availability. This posture permits regular overhauls to preserve the material condition of our ships and a reasonable personnel rotation which makes a surge capability possible.

(4) The foregoing percentages relate to the numbers of carriers maintained in a deployed status. The total force readiness to deploy in an emergency from a peacetime posture is a related and equally important factor. On 20 March 1970, eleven attack carriers were at sea or immediately ready to go to sea, two others could be ready in seven days, and one more in 60 days in an emergency. One attack carrier is in extensive overhaul.

F-14C DEVELOPMENT

Senator Cannon. Now, this year, in this year's program are you requesting funds for the F-14C aircraft?

Admiral Moorer. No, sir.

Senator Cannon. None at all.

Admiral Moorer. I think there are some in the R. & D., some small amount for the fire control system, but the money is primarily for the engine for the F-14B which also goes in the F-15 as well as the development of F-14 itself.

Senator Cannon. Well, don't you have \$5.2 million for R. & D. on

the F-14C?

Admiral Moorer. Yes, sir, for the fire control system, I believe. Senator Cannon. What is the estimated R. & D. for the F-14C? Admiral Moorer. The R. & D. cost, sir?

Senator Cannon. Yes, sir.

Admiral Moorer. Well, the R. & D. cost for the F-14C would almost be completely in the—it would use the same engine and the same airframe as the F-14B and I will get that exact figure for the record, Senator. I don't have it right here. We have only budgeted so far—we have an estimate of \$237 million for the total development.

Senator Cannon. \$237 million or \$337 million?

Admiral Moorer. I have \$237 million, sir. I will be glad to check that. But it is only \$5.2 million in fiscal year 1971.

(The information follows:)

We have \$5.2M in FY 1971 R&D for advanced avionics for the F-14C. We presently plan to transfer these funds at the FY 1971 Apportionment Request to support the advanced technology engine being developed by Pratt and Whitney for the F-14B/F-15. The FYDP calls out \$237M for F-14C avionics. Outside of FYDP years, an additional \$100M is required for a total of \$337M. These funds include the Multi-Mission Radar, weapons system and airframe interface, and a state-of-the-art electronic warfare suite.

Senator Cannon. Now, the 14-C would come in at what point in time?

Admiral Moorer. It would come in I think out in the

Senator Cannon. After how many airplanes? Beyond 722? Is that——

Admiral Moorer (continuing). 722? No, sir. I will supply that for the record, Senator. I don't have it right here.

(The information follows:)

It depends on the development of the Avionics. The development depends, of course, on the funding available. Our original plans called for introduction of the F-14C in 1975, but because of the nonavailability of funds it has continued to slip downstream into the out years. The concept of the multi-mission radar is a good one and we want to continue with the development, but the vehicle which uses it may be a follow-on fighter rather than the F-14.

AIRCRAFT PROCUREMENT EFFECT OF CARRIER FORCE REDUCTIONS

Senator Cannon. What effect would a reduction in your 15 carrier

force have on F-14 procurement?

Admiral Moorer. Well, it wouldn't have any immediate effect because our current carrier force contains ships that wouldn't be able to handle the F-14 type aircraft. So in the initial procurement, in the next few years, it wouldn't have any effect. Obviously it would have an effect in the out years depending on how many carriers we have. We hope to put the F-14 on all of the Forrestal class and larger. Right now with the Nimitz and the Eisenhower there are 11 of those ships.

Senator Cannon. How many F-14s has OSD approved for

purchase?

Admiral Moorer. 722 including 12 research and development

aircraft.

Senator Symington. 722?

Senator Cannon. That is the figure that I referred to a little earlier. I think that is the point where you would first come into the F-14C. That is why I raised this question as I recall.

Admiral Moorer. Well, I will have to check those figures for you,

Senator.

(The information follows:)

The total F-14 program as reported in the December 31, 1969 Selected Acquisition Report is 722 F-14 Aircraft (including 12 R&D).

CONDOR MISSILE PROGRAM OUTLOOK

Senator Cannon. There has been a lot of difficulty in the R. & D. on the CONDOR air-to-ground missile. How important do you be-

lieve it is for the Navy to go ahead with that program?

Admiral Moorer. I think it is extremely important, Senator [deleted]. The CONDOR gives us the capability to stand off at some [deleted] miles and also deliver a very large warhead at supersonic speed, [deleted]. So I believe that against sophisticated defenses, such as the SA-3 type, this missile will permit us to strike selected hard targets and at the same time cut down the loss of attacking aircraft

significantly.

Unlike any weapon to date, which are classified as READY-AIM-FIRE, CONDOR is of a new breed of READY-FIRE-AIM weapon. The CONDOR missile weapon system provides a very accurate [deleted] standoff weapon which will enable attack aircraft to destroy surface targets which can be, through [deleted] visually acquired without penetrating the effective zone of enemy defenses such as surface-to-air missiles (SAM's), AAA batteries and weapons similar to REDEYE and CHAPARRAL. Aim-point [deleted] provides the CONDOR system with a unique capability heretofore not known in the U.S. weapon arsenal. When we consider the effectiveness of the HAWK sites in the Middle East and the improvements we expect in the SAM-D and AEGIS defensive systems, it becomes clear that weapons delivered accurately from standoff will be essential to hold pilot/aircraft attrition losses to an acceptable level. A [deleted] of CONDOR will permit a very accurate or surgical insertion of [deleted] weapons without the need to penetrate the sophisticated defenses that would be anticipated in such a conflict. It is essential

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that the United States learn to develop and to use such a weapon, as CONDOR.

Senator Cannon. How many CONDORS do you plan on pur-

Admiral Moorer. Well, today we have, as you know, in funds for 30 OPEVAL weapons in the budget request. Depending on the outcome of all the tests, we would then specify what we call the ship fills. We are looking tentatively for a [deleted] buy through 1975. This is a tentative program.

Senator Cannon. And what would your unit cost per missile be on

that?

Admiral Moorer. [Deleted.]

WALLEYE AND MK-84 COMPETITION

Senator Cannon. Admiral, do you believe that the Navy's WALL-EYE and the Air Force MK-84 are competitive?

Admiral Moorer. Are you speaking of the MAVERICK? Senator Cannon. The HOBO.

Admiral Moorer. Competitive—are you saying duplicative or competitive?

Senator Cannon. Yes. Competitive weapons. In other words, pos-

sible duplication between the two of them.

Admiral Moorer. Well, both of them are of the electro-optical type and I guess in that sense they are duplicative; yes, sir. They have the same type of homing system.

Senator Cannon. Well, then, wouldn't it be possible to eliminate one

of these and possibly save some money?

Admiral Moorer. What you say might be true if we had initiated both developments with joint use in mind, sir. But in order for the Navy to adapt to the HOBO at this point in time, it would cost a terrific amount of money in terms of reconfiguring, adding test equipment, handling equipment, new containers, modifying the aircraft, and things of that kind.

I agree with you that had both developments been started at the same time, this could have been accomplished. As a matter of fact, we are now working in this area on the AGILE missile development to insure that it can be used by both the Air Force and the Navy.

Senator Cannon, I think during the fifties and the early sixties when most of these weapons came into being, there probably was some duplication. I do think, though, that Mr. Packard is watching this very carefully and all future developments will be aimed at eliminating this. The AGILE is the first effort in this direction.

Secretary Chafee. Also, Senator, as far as the WALLEYE II goes. the Navy, Air Force, and the Director of Defense Research and Engineering are getting together on this to determine whether the differences between WALLEYE II and HOBO can be resolved and therefore whether one or the other might be eliminated.

A=7 ACCIDENT RATE

Senator Cannon. Admiral, how many A-7s have you lost in noncombat accidents?

Admiral Moorer. I will get that for you. We did lose some, as you

know, Senator, from engine flameouts but I think we have that corrected now.

Senator Cannon. Was that the main problem that was involved?

Admiral Moorer. Yes, sir. Senator Cannon. What has been done to resolve that?

Admiral Moorer. Well, they have made some changes in the combustion chamber and in the compressor to correct this and, of course, the A-7E has an entirely different engine. The F-41.

Senator Cannon. Would you supply for the record the accident

rate on the A-7 if you don't have that available now?

Admiral Moorer. I will give it to you by type.

(The information follows:)

Through February A-7A/B/E combined accident rate for FY 1970 is 2.52 per 10,000 flight hours and is based on a total of 91,100 hours. During this period the A-7A/B rate was 2.73 over a total of 80,555 hours; A-7E was .95 for 10,551 hours. Overall A-7 accident rate for the first 250,000 hours of operation is 3.22. This compares to a rate of 5.36 for the A-4 aircraft during the same length of time following its introduction.

A-7 AIRCRAFT SUPPORT ROLE

Senator Cannon. Do you consider the A-7 aircraft a good airplane for the close air support role for the Marine Corps?

Admiral Moorer. I consider it is excellent for the close air support

role for any ground force.

I have here a message I just received with respect to the A-7E which points up the experience of one particular squadron out in California as it prepared to go overseas. In the first place, the aircraft can carry a [deleted] pound payload. We have had a complete squadron attain an average CEP of [deleted] with this airplane. The fire control system gives the pilot all kinds of flexibility as to how he approaches the target and what envelope he comes in on, and the pilots are most enthusiastic.

So far as the navigation system is concerned, it has been extremely accurate and the [deleted] CEP that I mentioned was obtained with the pilots having an average flight time of 55 hours in the aircraft.

UNIT COST OF PLANE

Senator Symington. Would you yield for one question?

Senator Cannon. Yes, sir.

Senator Symington. Admiral, if you buy 710 of these planes, the total cost is \$8,273 million, the unit cost \$11,400,000. What would be the unit cost if you bought 100?

Admiral Moorer. No, Senator. The 722, of course, that is simply

a planning figure and is not an approved figure.

Senator Symington. That is right. Would it be around \$30 million

an airplane, for 100 of them, or what?

Admiral Moorer. I wouldn't guess that, Senator. Let me supply this for the record.

Senator Symington. Would you.

Admiral Moorer. We don't intend to buy just 100.

Senator Symington. What would be the cost if you were only allowed to buy 100?

ADMIRAL MOORER. Yes, sir. That would be an estimate.

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Senator Symington. Of course.

Secretary Chaffee. You take the 100 and divide it into all the R. & D. and production costs. Would that be it?

Senator Symington. You segregated R. & D. as \$1,312 million. You would have to divide that also by the number of units purchased.

Chairman Stennis. Senator Cannon, you had already run over your time. If you don't object, I will just recognize Senator Symington.

Senator Cannon. All right, sir.

Senator Symington. Mr. Chairman, I appreciate that.

I asked a question this morning about the SABMIS. I am sympathetic about getting a lot of this at sea instead of around the land. It is my understanding there has been argument in the JCS, or somewhere in the Pentagon Building, about the relative merits of the ABM as against the SABMIS. I think you used the word complementary this morning. It is all very well for one service to be complementary to the other, or one Department to another, but the people of this country are going broke; and if the SABMIS is a better system to do the job, and if it could be done for less, why not go to the SABMIS!

I am not one who follows the Teller philosophy of making a fort out of the United States, for many reasons. Price is one. It is no fun

to live in a fort and so forth.

You come up with an airplane that is really a fighter-bomber at the most, and if you build \$8 billion worth, it costs \$11,400,000 apiece. It takes a lot of people's work and taxes to get that kind of money. I am getting very cost conscious about these high prices, and think you would too if you saw my mail.

Admiral Moore. I am sure I would, Senator, and I am cost conscious, too. I would like your permission to check these figures because I don't

agree that the airplane would ever cost \$30 million.

Senator Syminoton. Well, you have got \$11.4 million as the unit cost. The F-15 figures were somewhat more detailed. If they bought only 110, the unit cost would be \$24 million and it is a less expensive airplane than the F-14. I picked a figure out of the air. Whatever it is it is, and I know you will give the exact accounting.

Admiral Moorer. Yes, sir. Let me tell you this. As it now stands the unit production cost stands at \$11.2 million for 463 aircraft. That is

what it---

Senator Symington. I have got \$11.4 million unit cost for 729.

Admiral Moorer. Yes, sir. Well, I have figures that are contrary to those. I will be happy to supply the exact figures.

Senator Symington. Here it says total program cost \$8,273,600. Average program unit cost on the basis of of 710, \$11,400,000. I am reading off your own sheet.

Admiral Moorer. Well, I am reading off a sheet, too, that was given to the Senate Armed Services Committee, the Subcommittee on Tacti-

cal Air Force, on February 4.

Senator Symington. Where did you get this, Mr. Braswell?

Admiral Moorer. I will be happy to straighten this out.

Senator Symington. Is there any difference in the total figure of \$8,273,600?

Admiral Moorer. The unit flyaway cost is for 463 production aircraft. Yes, I think that is about correct. But I will give you a complete table on this, Senator.

Senator Symington. Fine. My guess is the figures we got a week ago are probably more accurate than the ones received the first part of

February. In any case, I would like to know how much for 100, for 200 airplanes, and for 400, as well as for 710.

Admiral Moorer. Yes, sir.

Senator Symington. Then we will have a clearer idea.

Admiral Moorer. All right, sir. (The information follows:)

The following table clarifies the derivation of the different F-14 unit costs of \$11.2 million and \$11.4 million which were referred to by myself and Senator Symington. Both figures are accurate and current as reported in the December 31, 1969 Selected acquisition report. As can be seen in this table, they derive from different quantities and baselines.

F-14 PROGRAM [Dollars in millions]

	Contr	act definition	plan	Current estimate total program		
	Quantity	Total cost	Unit cost	Quantity	Total cost	Unit cost
Development Production	6 463	\$974 5, 192	\$11.2	12 710	\$1,312.0 6,961.6	\$9.8
Total program	469	6, 166	13, 1	722	8, 273. 6	11. 4

With respect to F-14 quantities of 100, 200, 400 and 722, the following unit costs are furnished. These quantities each include 12 R. & D. aircraft and dollars have been escalated on the same basis as the December 31, selected acquisition report.

Quantity	100	200	400	722
Production unit cost (PAMN only)	16. 8	13. 9	11. 4	9. 8
Program unit cost (inleudes R.D.T. & E.)	29. 7	19. 6	14. 3	11. 4

SOVIET-U.S. SUBMARINE RATIO

Senator Symington. For many years, as you know, I have been worried about the lead the Soviets have against us on submarines. Kindly refresh my memory because I haven't made some of these hearings. The last figure was that the Soviets had [deleted] attack submarines, all built after World War II, and we have 107 attack submarines, only half of which were built since World War II. What are those figures today?

Admiral Moorer. Well, those are close. Projecting into the future we are expecting them to have fewer submarines but higher quality in the sense that they are replacing the diesel-driven submarines with nuclear-powered. The intelligence estimate calls for a total nuclear submarine figure of somewhere between [deleted] and [deleted] by

1979. That includes-

Senator Symington. Do you segregate the POLARIS-type out of those?

Admiral Moorer. Yes, sir. The estimate is for [deleted] by 1979. As I said this morning, at the current rate they could build up to 41,

which is the number we have by 1974.

Senator Symington. Last year the Preparedness Subcommittee with Mr. Gilleas handling the staff angle, had some superb hearings on submarines. I remember it was at that time [deleted] and against [deleted] exclusive of POLARIS-type submarines. Kindly supply for

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the record what they have now and what we have now, in this submarine field, and also what we estimate they will build in the next, say, 2 years and what we plan to build in the next 2 years.

Admiral Moorer. Yes, sir. I have it right here and I will put it in

the record.

Senator Symington. Thank you. If you have it right there you might

give it to us.

Admiral Moorer. Well, this is, of course, an intelligence estimate and it is divided into some [deleted] or so types of submarines, separated into diesel and nuclear, each one of which could in turn be divided into attack type and missile.

Senator Symington. Please supply it for the record and make those

definitions.

Admiral Moorer. It is quite complex.

(The information follows:)

		Mar. 1, 1970		Projected, July 1, 1972	
		U.S.S.R.	United States	U.S.S.R.	United States
Ballistic missil	e nuclear:)			
Y.	SSBN 1		j		
H-1	SSBN	l			
H-II	SSBN				
H-111	SSBN	l			
Total S	SBN		41	•	41
Ballistic missi	le diesel:	İ		•	
G-1	SSB	ļ			
G-11	SSB				
Z-Conv	SSB	l			
Total Co		i		-	
TOTAL S	SB	l	0		0
Cruise missile	nuclear:	l		•	
E-1	SSGN	1			
E-11	SSGN	ļ.			
T-4-1 00	201				
10(8) 55	GGN		0	_	0
Cruise missile	diesel:	1		•	
J	SSG	l			
W-Conv	\$SG	1			
T 0	•			-	
lotal SS	6G	l .	0	_	0
Nuclear:		[deleted].		[deleted].	
N	SSN		í		
E-I Conv	SSN		İ		
C	SSN 1		Ì		
V	SSN 1				
T-4-1 00				-	
10tal 55	in		43	_	
Long-range die	isal:	•		=	
F	SS		š		
Ž	SS		1		
				-	
i otal			59 L		
Medium-range	diasel:	•		=	
R	SS		i		
Ŵ	SS		I		
W-Conv	SSR.	ŀ	i		
				-	
Total			0		0
Short-range di	geal.			=	
O O	SS		0		n
[Deleted.]			" I		·
Total		•	0	-	0
				=	
Grand to [Deleted].	otal, submarines		143		

MISSILE COMPARISON

Senator Symington. One other question I would like to ask. Yesterday I went to a hearing. Senator Brooke has put in a resolution to have a joint moratorium on MIRV's but we would start out by not deploying the MINUTEMAN III, a unilateral action. In all this discussion of MIRV's they confine it to the MINUTEMAN. Isn't, in effect, a POSEIDON a MIRV?

Admiral Moorer. Yes indeed, sir.

Senator Symington. Based on the number of warheads, it is more of a danger than the MINUTEMAN, is it not? I would prefer to see a MINUTEMAN go up, if I were a Russian than a POSEIDON. Is that a fair statement?

Admiral Moorer. Yes, sir, if you are only to be fired at with one missile. I think you have to look at this in the context of the overall strike because the MIRV—in addition to providing the capability of target selection within what is called the footprint of the missile—also facilitates penetration and that is why we built it. In other words, by converting the POLARIS submarine to the POSEIDON we were able to make the submarine more effective, and consequently eliminated the need for a large number of additional submarines.

Senator Symington. Well, I don't want to labor it, but the truth is the SS-9 has everybody in a sweat all of a sudden. It is really nothing more or less than an improved TITAN. It is just a big

TITAN with a-

Admiral Moorer. Improved hammer.

Senator Symington. Right. A better CEP and a larger warhead, both of which we would have had on the TITAN if we had kept on with it. We abandoned that and went to numbers, you might say, as against punch.

Now, if we go for an ABM deployment and POSEIDON, both, if I were a Russian I would think we were going for first strike capability. You may not agree, but do you understand my hypothesis?

Admiral Moorer. I understand what you are getting at but in order to make a first strike-

Chairman Stennis. Make your answer brief.

Admiral Moorer. Yes, sir. To make a first strike you have to have the decision to go first. There is more to this than hardware.

Senator Symington. We feel the Russians want a first strike capability, but we don't. The Russians feel we want it, but say they don't.

Thank you, Admiral. Admiral Moorer. Yes, sir.

(The information follows:)

To extend the discussion on first strike and MIRV, it is important to note that the survivability of a sea-based MIRV is such that an enemy has little chance of destroying it in a first strike whether he has MIRV or not. The fact that the enemy knows he cannot destroy the sea-based MIRV in a first strike lends credence to our stated purpose that this is a second strike retaliatory weapon designed for ABM penetration. He knows that we don't have to fire the sea-based missile first in order to insure its availability as a retaliatory weapon. Further, it enhances deferrence because the enemy knows that as long as we have the mobile sea-based missile, he cannot gain a decisive military advantage through a first strike on the United States. When the vulnerability of our strategic offensive forces is minimized by secure basing, our deterrent posture is maintained and is not dependent on the enemy's ICBM technology.

MARINE RESERVE READINESS LEVEL

Chairman Stennis. Now, General Chapman, back to your Marine Corps for a few minutes. You say that your Marine Reserve Division could be ready in 60 days for combat.

Now, does that include readiness for combat by your aircraft, with

100-percent representation?

General Charman. Yes, sir. It is the readiness of the Division, the Wing with the aircraft that the Wing has and the Force troops.

Chairman STENNIS. Do you have it up to the authorized level for

the planes?

General Chapman. Yes, sir. We have the authorized numbers. The problem we have is that some of the aircraft are not fully modern; but we have the authorized numbers of fighters, day fighters only, not all-weather fighters.

Chairman Stennis. I am very much impressed that you can have a whole division ready in 60 days including the air wing, but what do

you lack in proper aircraft for that wing?

General CHAPMAN. We lack an all-weather fighter, a day and night fighter, an all-weather attack airplane. We have daylight attack only. We lack sufficient capacity, capability, on the part of the helicopters. We have the sufficient number of UH34s but they carry less than half of the CH-46 which is what we really require.

Chairman Stennis. Well, spell that out and what are the prospects

of you getting the aircraft you need for that Reserve.

General Chapman. Very well. Would you like me to supply that for the record?

Chairman Stennis. Yes, because we must move along. (The information follows:)

TABULATION OF THE AVERAGE AGES AND SHORTAGES OF MARINE CORPS RESERVE AIRCRAFT FORCES. IDELETED

	A/C allocated Number Series		Average age/years Shortages			Expected attainmen year 1
Planned squadrons						
Deleted Fighter/attack (VMFA) [deleted] air- craft Deleted Visual attack (VMA) [deleted] air- Deleted RECON (VMJ) [deleted] aircraft Deleted Aerial refueler/assault transport (VMGR) [deleted] aircraft Deleted Heavy helicopter (HMH) [deleted] air- craft Deleted Medium helicopter (HMM) [deleted] air- craft. Deleted Light helicopter (HML) [deleted] air- craft.	Deleted]	F-8-K/L A-4B/C/L RF-8G C-119	3 1 13 3 3 20	}[Deleted]		
Craft Deleted Observation (VMO) [deleted] aircraft Deleted Tactical support transports (TST)		0V-10	3			
[deleted] aircraft		C-54 C-117	26, 27	j		

¹ No specific procurement for 4th MAW exists. Procurement is for total Marine Aviation, Current or PO-72 inventory will support Marine Corps objective for 4th MAW in fiscal year indicated.

2 [Deleted.]

3 These aircraft have undergone extensive rework and conversion after which an extended service life of 4.8 years was assigned.

Members of the committee, I would especially appreciate all who can be here tomorrow afternoon for 30 or 40 minutes anyway when we reconvene at 2:30. We are going to have a witness here that I have asked be brought here from Germany on this tank matter. We have got to make a serious decision on it.

HARRIER PROGRAM

All right. Now, we will move along a little faster, General Chapman. The Congress authorized last year the procurement of the Harrier, partly on the premise that the Marine Corps was going to buy 12 of these aircraft to see how they worked out.

Now, this is the British plane. This year's procurement will contain a further request for 18 aircraft at \$96 million.

Now, why not wait until the first aircraft have been tested out before buying more since the first one of last year's procurement has not yet been delivered? It is the same old matter here of going into this production before you really have finished testing. What about that, General?

General Chapman. Well, sir, the Harrier really doesn't need testing. It is an operational airplane now. I mentioned this morning-

Chairman Stennis. Well, you haven't tried it out, though, for your

General Charman. Well, sir, we have had Marine pilots over there flying the airplane in England for a year now and the British have gone operational with it. They formed one squadron which is now maneuvering in [deleted] as I mentioned this morning and they are going to deploy another squadron to [deleted] an operational squadron.

This airplane has more flying hours and more sorties and more testing than any airplane we have ever bought. It has some [deleted] hours

on it now. So it really doesn't need any further testing.

Now, the problem with buying these 12 and testing before buying others would simply be that the production line would close down. There would be a hiatus of about 2, possibly 3 years, and there would be extra money required to start the line up again.

Chairman Stennis. Don't you remember, though, last year it was more or less understood that we were going to get these 12 and you were going to follow up with more use before we went to starting up?

General Chapman. No, sir, I don't.

Chairman Stennis. Do you remember it that way, General?

General Chapan. No, sir, I don't.

Chairman Stennis. Well, I got this idea around this table or at some other conference on it.

General Chapman. Our plan last year on this was to program a total

of [deleted] airplanes.

Chairman Stennis. All right. Now, get-

UNIT COST

General Chapman. Four years. I was going to say [deleted] airplanes to be bought over a period of 4 years.

Chairman STENNIS (continuing). All right. Well, now, when you buy them in Great Britain how much do they cost you apiece? How much do you expect them to cost today? Do you have that ready?

General Charman. I don't have that exact figure. I have got the total cost but I don't have it per airplane. I can furnish that for the

Chairman Stennis. Now, on this question—I understand now what the arrangements are that are being made so that the Harrier, to a large degree, will be made in this country rather than in Great Britain,

but at an additional cost of over \$200 million.

General CHAPMAN. Yes, sir. Pursuant to the express wishes of the Congress, a plan has been worked out to phase the production into the

Chairman STENNIS. You are going to make it here on the British

patent.

General Chapman. That is right, sir, and that program would begin with the 1971 portion of the program. Now, the additional dollars are significant as compared to buying in Britain, it is true.

Chairman Stennis. Well, would it be any better—— General Chapman. It will be exactly the same airplane, sir.

Chairman Stennis. That will come to 18 from 96 which will be-

Senator Symington. \$5.333 million.

Chairman STENNIS. All right. Now, is that with the American manufacturers or the English? The record doesn't show whether your figures are based on the plane made in England or whether it is made over here.

General Chapman. Our budget submission? It is based on manufacturing in the United States. The beginning of phasing of manufacture

into the United States.

Chairman STENNIS. Well, that is a rather involved matter. It is going to cost for the program about \$200 million—\$235 million extra

for it to be bought over here.

General CHAPMAN. Yes, sir. That is comparing our original plan for a 4-year procurement in Britain with a 5-year procurement in the United States. The difference between a 5-year plan in England and a 5-year plan here is about \$110 million rather than \$200 million.

Chairman STENNIS. All right. Now, let me put it this way. I have the figures here, more brought out than I had realized. You are recommending now the purchase of [deleted] Harriers at a cost of [deleted] million in the United States, recognizing that they could be purchased in England for \$385.3 million.

General Charman. Well, sir, we are carrying out the expressed intent of the Congress to buy America in last year's appropriations act.

and we have worked up this plan to execute that desire.

Chairman STENNIS. Well, you just said, though, that the figures here would represent the United States figures.

General Chapman. Yes, sir, they are representing-

Chairman Stennis. Now, isn't it true further about this Harrier that it has flown [deleted] hours only with the Royal Air Force as of January 1, 1970, and do you think that that is enough to commit the Marine Corps to the purchase of [deleted] aircraft?

General Charman. Oh, yes, sir. That is a large number of hours. That is more, many more hours than any airplane we have ever

bought.

Chairman Stennis. How long have you had your men over there flying these planes?

General Chapman. About a year, sir.

Chairman Stennis. Do you know about the accident experience and all?

General Chapman, Yes, sir.

Chairman Stennis. Of the Royal Air Force?

General Chapman. There has been a total of [deleted] of which were pilot error. One was a [deleted] and one was another kind of [deleted] error. It has an excellent accident record.

Chairman STENNIS. Well, what about the charge here that the Harrier is competitive with the Air Force AX, and the Army's Cheyenne?

What is your answer to that?

General CHAPMAN. Well, sir, the Harrier is, as we just said, an operational airplane now in service. The AX exists at this time only on paper and the Cheyenne, of course, you know the troubles with it.

Chairman STENNIS. They are both in the budget, though; they want

to build them up.

General Charman. Well, sir, they are in research and development,

I believe.

Chairman Stennis. Yes, but they are wanting more and more money. We are starting to build up the Harrier. I am not necessarily against the Harrier but I want to get all three of them out here together. So you have us building three now, starting on three, and why

do you think the Harrier is better for you?

General Chapman. It is an operational subsonic high-performance jet airplane with capabilities similar to an A-4, and in addition has a VTOL and VSTOL capability. It can exist in the air in a hostile environment and carries a good payload. We can base it up near the front lines, and in general we are confident that it can do a job for us that nothing else will do.

Chairman Stennis. All right. We will have other questions here that I will put in the record about this Harrier, General Chapman.

General CHAPMAN. Very well, sir.

LAWYERS PAY BILL

Chairman Stennis. Now, we have here a bill for special pay for the lawyers and there has been a lot of correspondence about it. The Navy seemed to have joined in the recommendation for the passage of that bill, but it is reported to me that the Navy feels that it will raise serious problems, too, with respect to your regular line officers, and so forth, since you also have a shortage there. There is a shortage there in the lower grades.

Now, what is your response to that, Mr. Secretary? You and Ad-

miral Moorer both, if you will answer briefly on that one.

Secretary Chaffe. Any time you get a special pay bill, Mr. Chairman, it raises problems. You have to weigh the problems against the problem you have without the bill; and without this bill we have great difficulty getting lawyers and retaining lawyers.

Chairman Stennis. Except for remote places, why can't you hire some lawyers downtown to represent you when you have to try all

those cases with a lawyer every time a charge is made?

Secretary Chaffe. Mr. Chairman, I think with the price of lawvers these days, it would be far cheaper with a bonus. I really do. Also you have some control over the qualifications, the training, and the availability of a military lawyer; it is a specialty, this military law. It isn't a field that somebody can just come into occasionally, and expect to do a good job.

Chairman Stennis. Well, Admiral Moorer, why don't you try with the responsibility pay that you gentlemen have had for years—in 1958

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we put a provision in there about responsibility pay—At least try it out, base it on the responsibility a man is carrying. If these are so responsible then why don't you pay them more than you pay a man as someone said for knocking his head against a ship out at sea? It looks like they qualify for responsibility pay. We want to consider the bill but we want you to respond.

Admiral Moorer. As you know, we haven't used this responsibility pay. You can either speed up promotion or you can give responsibility pay or you can just raise the pay as we have done here, and I think the general consensus is that special pay for lawyers would serve to

improve the retention rate better than any other action.

I personally do feel that any time we go in for special pay for one

selected group it has a significant impact on the other officers.

Now, we have been forced into that with respect to the submarine officers. It boils down to the law of supply and demand, Mr. Chairman, when you get right down to it, as to what action you have to take to meet your requirements, and I think you should handle these problems on a case-by-case basis.

Chairman Stennis. What caused you to have a greater demand for

the use of lawvers?

Admiral Moorer. Well, recent changes in the code have required a significant increase in the number of lawyers in the sense that the lawyers now participate to a much greater degree in the various and sundry legal actions that occur within the military. I have forgotten the exact numbers but we did find it necessary to add several lawyers to our list because of these additional requirements that were imposed on us.

Secretary Chaffee. Mr. Chairman, could I give you one figure? Chairman Stennis. Yes; but briefly, if you don't mind. My time

is about up and I have got to go to the floor, too.

Secretary Chaffe. We have 750 lawyers in the Navy and 500 of them are serving on their initial obligated service—500 out of 750. But for the draft and the fact of obligated service, these young lawyers wouldn't be with us.

Chairman Stennis. Well, it is quite a problem for you and it is

a problem for us, too.

General CHAPMAN. I would like to add a figure, Mr. Chairman. (The information follows:)

The Marine Corps has 382 lawyers on active duty, 299 of which are serving on their initial obligated service. Of the 299, 51 have not yet been certified as trial/defense counsel for courts-martial.

Chairman STENNIS. It is a problem. We are going to try to get into it. We are going to have hearings on it. But I know what will come when we pass that bill. Talk about the domino theory—that is where you will have it falling all over you, I believe.

All right. Thank you very much. I am going to come right back.

Senator Smith, I will call on you.

HARRIER VERSUS A-X AND CHEYENNE

Senator SMITH. Thank you, Mr. Chairman. The chairman was talking to you about the AX and Chevenne and I understand you to say the AX was on paper, which we know, and the Chevenne is having

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its difficulties, but if the AX and Cheyenne were available, would you

still prefer the British-made plane?

General Chapman. Yes, Senator. It is a high-performance jet and can live in the air. It has performance capabilities, as I said, similar to an A-4 plus the VSTOL, VTOL capabilities. The AX is a low-speed airplane, twin-engine. The Cheyenne, as you know, is basically a helicopter. So I think the advantages of the jet high-performance airplane with the special VTOL characteristics are quite evident.

HELICOPTER GUN SHIP SURVIVABILITY

Senator SMITH. General, what would be the survival chances of a helicopter gun ship in a European war or conflict in North Vietnam? General Chapman. The survival chances of an armed helicopter in a European conflict?

Senator Smith. Yes.

General Chapman. That would depend on so many things, Senator Smith. If we have control of the air, and if the helicopters are properly protected, I think its survival chances would be good. But there are many if's in that answer.

Generally, an armed helicopter is fairly survivable. It is small, it is very handy, very maneuverable. It can take advantage of terrain and cover, but, of course, once hit by a missile or any weapon, it is going to come down because it has got less hardness than a jet airplane.

Senator Smith. My question was European war or a North Viet-

nam conflict.

If you would look that answer over-

General CHAPMAN. Did you say North Vietnam?

Senator Smith. Yes; I did say North Vietnam, but I did not mean North Vietnam. I meant Vietnam.

General Chapman. Yes, Senator.

Senator Smith. If you will look it over and elaborate a bit. General Chapman. Yes.

(The information follows:)

The chances for survival of any aircraft whether it be a high speed jet or a helicopter, depend entirely on the anti-air offensive and defensive capabilities of the enemy. Since helicopters are relatively slow aircraft, they are more vulnerable in combat than high speed fighter and attack aircraft. Marine Corps doctrine for the operation of helicopters is based on the principle of air superiority. (We would not use helicopters in an area dominated by anti-aircraft defenses. In Europe and North Vietnam where the anti-air capabilities are significantly greater than in South Vietnam, our strategy would be to reduce the hostile environment to a level acceptable for helicopter survival.) The F-14, A-4, Harrier. F-4 and A-6 high performance aircraft would be used to roll back the defenses to permit operation of the armed helicopter.

MARINE RESERVE AIRCRAFT READINESS

Senator Smith. You were talking also to the chairman about the Marine Reserve readiness. Would you provide for the record, if you please, just what you mean by that? Also you say that you had plenty of aircraft but they were not all good aircraft.

Give us the types and the ages, what you need and what you have. General CHAPMAN. I will furnish that in detail for the record. Senator SMITH. I think that would be helpful in our thinking. (The information appears on page 1324.) Digitized by Google

MEDITERRANEAN FORCES ROLE IN EUROPEAN WAR

Senator Smith. Admiral Moorer, I was asking you about the NATO forces and I had another question that I omitted. What would be the role of our ASW Mediterranean Naval and Surface Forces in a European nuclear war?

Admiral Moorer. It would be manifold, Senator Smith. In the first place, it would be mandatory to maintain the sea lines of communication in the Mediterranean open. Secondly, it would be necessary to defend the flanks of NATO from an attack by the Soviet seaborne forces. And in addition to that we would have the mission of supporting ground troops from the sea, not only with aircraft, but also with destroyer and cruiser types with gunfire support similar to what we are doing now off the coast of Vietnam.

So in general, we could list tasks more or less like I did this morning. First, maintaining the sea lines of communication. Secondly, denying them to the use of the Soviets. And third, assisting the ground

forces ashore.

(The information follows:)

At sea, fleet nuclear weapons could be used in the ASW or AAW (anti-airwarfare) role, or against enemy surface units. Such employment could be carried out by our submarines, surface ships or aircraft.

In support of the land battle in Europe, our carriers would operate as an element of a fully integrated NATO force under overall command of SACEUR.

[Deleted.]

Of course, the use of nuclear weapons in any of the plans and situations mentioned above must first be authorized by the President.

CHEYENNE CAPABILITY

Senator Smith. Admiral Moorer, on Naval coast support of our

Asian allies, could a Chevenne survive, do you think?

Admiral Moorer. I think the answer to this question is not unlike the one that General Chapman just gave to the general helicopter problem. It could not survive unless you had associated with it other aircraft to provide the necessary defense against the enemy fighters. I won't say it could not in any sense survive but the attrition would be much higher without this type of airborne defense, and then, of course, you have the problem of the ground fire. I think that it could be adequately protected so it could survive, ma'am, but it would take other aircraft to do it.

IMPROVEMENT OF COMMUNICATIONS SINCE PUEBLO

Senator SMITH. Would you tell the committee what has been done about the communications improvements that could be applied to another *Pueblo* incident?

Admiral Moorer. Yes, Senator. The Commander in Chief, Pacific, at the direction of the Joint Chiefs of Staff, has made a complete review of the communications arrangements within and between commands. Furthermore, we have had many, many drills to reduce the command and control reaction times, and I think by and large communications are in good shape.

However, I do not think that communications per se really played a key part in either the *Pueblo* or the EC-121 incident. I think gen-

erally speaking it can be said that the communications themselves—that is, the mechanical act of communicating—worked satisfactorily, Senator Smith. Nevertheless we have gone into the entire command and control structure and as I say, have exercised it many times in this particular simulated environment to insure that everyone would respond quickly and promptly to what happened.

But for instance, let's take the EC-121. No amount of communica-

tions would have helped that situation.

(The information follows:)

However, it is important to have rapid and complete dissemination of operational information to commanders responsible for command and control of forces. To improve dissemination of necessary information, several steps have been taken. First, all commanders of unified and specified commands have been designated to receive, simultaneously, critical intelligence disseminated from the National Command Authorities; second, additional personnel have been granted the necessary clearances to allow dissemination of critical intelligence information to all echelons of command: and third, studies are being conducted to develop a means of automatically, through existing facilities, disseminating critical intelligence to commanders at all levels of command.

Commander in Chief, Pacific has proceeded with a plan to establish information centers, throughout the Pacific Command, to act as information gathering and dissemination centers. These will utilize existing facilities while ensuring

that information is properly disseminated.

RELIABILITY AND COST OF MISSILE SYSTEM

Senator SMITH. In thinking of our survivability insurance of our deterrent forces, could you tell us the difference in costs of a SAFE-GUARD system such as we talked about as compared with the POLARIS/POSEIDON system, both as to cost and reliability?

Admiral Moorer. Well, I think again the Army can supply these figures better than I. The total SAFEGUARD cost—and I am just giving this from recollection—is something around \$11 billion, but again I would want to be able to correct that. The total POLARIS

system cost depends on where you cut off.

From the very beginning through 1970, it has been a total of \$14,889,423,000. But that includes everything in terms of the training, the shore stations, the construction of the ships, the purchase and testing of the missiles, the entire package. I am not qualified to speak on the exact costs of the SAFEGUARD.

Senator SMITH. What about the reliability of both systems?

Admiral Moorer. We feel that the reliability of POLARIS has been exceptional because it is a system which can be fired at sea utilizing the entire weapons system, and we do this frequently. That is, we will take a submarine [deleted].

He does not know exactly when he is going to get this order. So here we have a full test of the communications system and the missile

performance, in terms of response time, accuracy and so on.

So the reliability of the system is very high. We have proved it over and over.

[Deleted.]

In addition to this Operational Testing each SSBN crew conducts a comprehensive two-week Demonstration and Shakedown Operation (DASO) at Cape Kennedy designed to check-out the FBM weapons system and crew performance after a shipyard overhaul prior to de-

polyment. The DASO is culminated with an actual or simulated missile launch. At least one successful DASO missile launch is conducted by each SSBN.

Results of POLARIS missile testing to date are as follows:

	Total launches	Total successes	Percent
Operational tests:			
A-3 DASO:	[Deleted]		
A-2A-3			

The extensive history of testing, under actual operational conditions, allows high confidence in the reliability of the POLARIS weapons system. The operational test program began in July 1962 on the now retired A-1 missile. Testing on the currently operational A-2 and A-3 missiles began in April 1963 and September 1965, respectively. Operational tests routinely provide a constant reverification of system reliability.

GATES COMMISSION REPORT

Senator Smith. Mr. Secretary, I would like to ask you, Admiral Moorer and General Chapman to answer a question for the record, not at this time. I would like to have each one of you state specifically your points of disagreement with the Gates Commission Report, if you have any points of disagreement. If you will think that over and give us something for the record.

Thank you, Mr. Chairman. (The information follows:)

General Chapman. As you know, with rare exceptions the Marine Corps has been traditionally an all-volunteer force, and we have had a high degree of success with the young Americans who have joined of their own volition. For the foreseeable future we expect that we will be able to attract recruits in the required number and quality without resorting to induction. The Gates Commission has made a number of proposals which, if implemented, should substantially enhance our capability to attract high-quality personnel. I refer to such proposals as expanded recruiting efforts to attract well motivated and qualified personnel, increased pay for officers and enlisted personnel in the first 2 years of service, increased use of programs to include both scholarship and nonscholarship options, and incentives to attract persons with special skills or unusual aptitudes.

I have reservations, however, concerning some of the Commission's proposals, and I question some of the conclusions upon which it based its recommendations. My principal reservations relate to officer procurement, our ability to attract reserve personnel with the ability, dedication, and capacity for growth that are so vital to maintaining a combat-ready Reserve Force, career incentives, and the cost of a volunteer program both in peacetime and upon mobilization.

The Marine Corps has been experiencing increasing difficulty in meeting its requirements for officer accessions. Antimilitary and antiwar sentiment among college youths and the attractiveness of civilian occupations have undoubtedly contributed to this poor recruitment atmosphere, and a draft-free environment may well adversely affect procurement of officers further. Recent surveys within the Marine Corps indicate that officer accessions have been motivated more by the draft than enlisted accessions.

In considering the Reserve Forces, the Commission has placed undue reliance on a small increase in drill pay to satisfy the manpower needs of our organized Reserve units. More than 70 percent of the reserves in organized units enlisted because they were draft motivated; so I seriously doubt that in the absence of

draft pressure, the proposed improvements in compensation will attract sufficient

volunteers of adequate quality to satisfy Reserve requirements.

The Commission has placed very little emphasis on the career force, but suggests that a combination of increased pay for personnel in the early years of service and recommended changes in personnel management will provide enough additional volunteers to achieve an all-volunteer force. I believe the key to maintaining a highly competent all-volunteer force is a career force base of officers and noncommissioned officers of high quality and demonstrated competence. In a draft-free environment, this will require significant improvements in areas other than compensation and improved personnel management. For instance, the image of the Armed Forces must be enhanced, both internally and publically, and deficits in military housing for both bachelor and married personnel must be eliminated.

The report estimates that the sustaining cost of an all-volunteer force ranges from \$1.5 billion, for a 2 million man force, to \$4.6 billion for a 3 million man force. I am concerned that these estimates may be below what will be required. This concern stems from my belief that the incentives proposed by the Commission will not be sufficient to attract and retain the required number and quality of officer and enlisted personnel, both regular and reserve. Mobilization is also an area in which the report of the Commission did not adequately cover the economic considerations. In the event of mobilization, the cost of military personnel alone at the entry level pay scales proposed by the Commission would create a great financial burden.

Secretary Chaffee. I fully support the objective of an All Volunteer Military Force. Both President Nixon and the Gates Commission have given persuasive reasons for such an objective and the counter arguments have been fully and

fairly considered in the Gates Commission report.

The Gates Commission proposal specifically calls for complete elemination of the draft in July 1971. To achieve this objective, the Commission calls for establishment of substantially higher levels of pay for officers and enlisted men or their first tour of duty and makes a series of recommendations to make service life generally more attractive. It also makes a series of projections as to the effectiveness of these recommendations. In arriving at these projections, the Commission, of necessity, had to make a number of assumptions, the validity of which, in many cases, can legitimately be questioned and can be verified only by actual experience. For example, we cannot be entirely sure of the depth of anti-military feeling in the country, to what extent pay is the critical factor in actually attracting and retaining men in the military services, or whether all those serving beyond their minimum obligations can be considered to be "true volunteers". Even if we could accurately predict the effect of higher pay, we cannot project, with any certainty, future inflation and unemployment trends.

In addition to the assumptions made by the Commission, several of their recommendations should be examined—carefully and cautiously—to ensure that the potentially adverse consequences of such actions do not outweigh their desirable effects. For example, what will be the effect of the morale and retention of career personnel if the pay increase is substantially higher for the first-term enlistees? What will be the effect on the quality, morale, and retention of our officer corps if we are forced to lower standards because of recruitment problems? What will be the effect on our readiness if we should accept more Group IV enlistees because recruitment of better qualified personnel does not materialize? These examples illustrate the necessity for a thorough review of

the recommendations of the Commission prior to implementation.

If the draft is eliminated and if some of the assumptions in the Commission report prove to be incorrect, our national defense posture could be seriously undermined. Therefore, I believe the basic approach of the Gates Commission should be modified by aiming for zero draft calls rather than outright elimination of the draft by a given date. In this way, we can proceed step by step, testing in practice the assumptions of the Commission report without risking unnecessarily our defense posture. If we are able to arrive at zero draft calls, through the adoption of incentives such as those recommended by the Gates Commission, we can then consider formally eliminating the draft with assurance that doing so would not put us in an untenable position with respect to attracting and retaining enough volunteers to adequately man our military forces.

Admiral Moorer. The Navy supports the objective of the Gates Commission Report in reducing draft calls to zero. However, I do not share the confidence expressed by the President's Commission that the draft can be eliminated by July 1971. In moving toward a zero draft environment we must be certain that we take no irrevocable step which could cause force levels to fall below those recommended by the National Security Council for mission responsibility. We support and welcome the President's objective of a truly all-volunteer force, but we believe that the Gates Commission has possibly overlooked the President's policy goals as expressed in his October 18, 1968 address. The goal was to move toward an All-Volunteer Force once our involvement in the Vietnam war was behind us, and recognized that the draft would have to be phased down so that at every step we would be certain of maintaining our defense strength. We do not consider that the arbitrary date of July 1971 expressed in the Gates Report for draft termination is in consonance with this policy.

The Gates Commission Report has a basic deficiency in concluding that our goal of zero draft can be achieved primarily through competitive pay at the entry level. While we do not dispute that entry level pay improvements are essential in moving toward the zero draft environment, we do not concur in the Commission implication that career compensation is not a problem. This is a basic but very significant point. A viable All-Volunteer Force cannot be achieved and sustained unless it can both attract and retain the required numbers of high quality dedicated personnel. This will require significant improvements in compensation for both the enlistee and careerist, easing of the housing problem for both familyman and bachelor, improved opportunity for in-service advanced education and generally improved conditions of service. We believe that the Gates Commission has erred in expecting too much from entry level pay improvements, and has inadequately addressed these other improvements which will be necessary. Retention of professional career officers and enlisted men has been the Navy's primary personnel problem for many years. It requires 10 recruits to produce a replacement for one career petty officer lost. We are convinced that we can both attract and retain the high quality personnel we require if military career attractions are made highly competitive with civilian careers. We believe that one of the most significant steps we could take to achieve our zero draft goal is implementation of a military pay system at an early date which would be both internally equitable and externally competitive with civilian employment. Such a system if properly structured would solve most of our pay inequity problems with one action. A related area of the Gates Report concerning careerists compensation is Table 5.II which compares military and civilian earnings. Military and civilian pay cannot be equated through any simple comparison of age and education. Table 5.II compares the pay of a homogeneous group of the most successful of military officers, men who at the Navy Captain level have survived heavy selection attrition on five occasions with a heterogeneous group purported to be their average civilian contemporaries, i.e., those who have failed as well as succeeded. If the table was accurate and Naval officers were paid 150% compared to civilians of similar skill and ability, I do not believe we would have a retention problem.

I do not concur in the Gates Commission conclusion that lowering our standards to accept a specific quota of low mental group enlistees is a desirable or proper method to achieve an All-Volunteer Force. We believe that the qualitative needs of the military must be fully recognized and not be diluted for the purpose of the more easily obtained quantity. This subject should be readdressed at a later date when more research and experience are available.

We also urge caution in identifying military billets available for civilian substitution. We recommend an approach to the All-Volunteer Force that adopts officer and enlisted structures which meet job needs at each career level and provides proper sea/shore rotation for each element of these structures. Civilian substitution quotas must not be arbitrarily imposed as a simple method of reducing the numbers of military personnel required in an All-Volunteer Force. We do not see at this time how the indefinite enlistment term proposed by the

We do not see at this time how the indefinite enlistment term proposed by the Gates Commission could have other than a calamitous effect on personnel management and stability. All forms of enlisted planning such as strength, budget, long term training, and advancement plans would be seriously impaired by loss of fundamental point of departure, i.e., a way to estimate attrition. The Commissions report is in error in stating the Officer Corps has no contractual obligation since regular officers do not have the option of leaving the Service when they choose and are held when necessary. They serve at the pleasure of the President.

Finally, we are apprehensive concerning the ability of the pay increases described in the Gates Report to achieve and sustain the required combat ready Reserve Forces. There are a wide range of factors which will affect our ability to attract and retain Reserve Forces. These include the quality of equipment on which they train, compensation in some form for disruption of their primary vocations during training periods and the attitude of the civilian sailor toward military life. Actions directed toward achieving the zero draft goal for the active forces will not necessarily be effective for the Reserve Forces. We believe that achievement of the All-Volunteer Reserve Force will be every bit as difficult as reaching our zero draft goal for the active Force and will present a separate but related problem.

ACCIDENT RATE OF HARRIER

Senator Symington (presiding). Thank you, Senator Smith. General Chapman, I would like to get straight in my own mind the cost of the Harrier. A note has been given to me by the staff, with respect to the accident record, that the Harrier has a good record, one accident every [deleted] hours; but the F-111 is in trouble with an accident only every [deleted] hours.

You might comment on that for the record because I must leave

(The information follows:)

When comparing the accident records of two aircraft, it is established practice to arrive at a common basis in order for the comparison to be meaningful. Since Harrier and the F-111 are operated under totally different circumstances, particularly during take-off and landings, a meaningful common basis is nonexistent and a comparison would be misleading. Harrier is unique in that it is the only operational V/STOL in the free world with no other aircraft similar enough to form a basis of comparison.

To provide an appreciation of the magnitude of the problem of arriving at a common basis, the region of flight that has historically accounted for the major portion of accidents has been take-offs and landings. The average flight time per sortie for Harrier in RAF training and development work has been about [deleted] minutes, while the F-111 flies about 2 hours and 35 minutes per sortie. Therefore, for a comparable number of total hours, Harrier has more than [deleted] times the exposure rate in the take-off/landing phases than the F-111.

For a comparable time span in the operational experience of each of the aircraft, more emphasis has been placed on the take-off and landing phase by Harrier than the F-111. This further increases the exposure rate. In addition to the higher exposure rate, Harrier does not operate in this phase as a conventional high performance jet aircraft such as the F-111. Where the F-111 uses long runways and high speeds for takeoff and landing, the Harrier normally takes off either STOL or vertically and normally makes either a vertical landing or rolling vertical landing. From the standpoint of accidents based upon flight hours the F-111 should appear better due to the long average duration of F-111 flights. From the standpoint of accidents per 10,000 takeoffs and landings the Harrier would be superior.

Lower takeoff and landing speeds of V/STOL aircraft are expected to reduce aircraft accident rates as has been the case with helicopters. For instance, during 1966 and 1967 approximately one-third of all noncombat aircraft accidents in the U.S. Navy and USAF occurred during the landing phase. In the category of landing accidents, the accident rate for conventional landings is generally about three times as high as for vertical landings. A tactical V/STOL aircraft's normal landing mode is vertical. Takeoff accidents like landing acci-

dents, appear to be directly related to ground velocities, and as such, should be reduced by short (lower speed) takeoff operations.

In the first 10,000 F-111 flight hours which would equate to approximately 3700 sorties based upon the average sortie duration of 2.7 hours, the F-111 had [deleted] accidents and [deleted] aircraft were destroyed. During Harrier's first [deleted] sorties there were [deleted] accidents and [deleted] and [deleted] aircraft were destroyed. While a lesser number of Harrier aircraft were destroyed, there is no valid basis for comparing the two aircraft.

It is significant that there has been only one fatality in nearly 10 years of flying P-1127, Kestrel and Harrier aircraft. As of 31 December 1969 these aircraft collectively had flown [deleted] sorties and [deleted] flight hours, and most of the sorties were devoted to the takeoff and landing operations. Now that the second RAF Harrier squadron has formed, the sortie duration will be lengthened with increased training in weapons delivery and navigation. As a result flight hours will build more rapidly in relation to numbers of sorties.

Harrier is unique and the Marine Corps believes that it has a good safety record.

PREPARED QUESTIONS FROM SENATOR SYMINGTON

Senator Symington. I would also ask unanimous consent from the committee to file some questions for the record, based on testimony this morning. Without objection, that will be handled.

(Questions submitted by Senator Symington. Answers supplied by Department of the Navy.)

Question. What Ascal guidance did you receive from OSD originally in order to prepare the Ascal year 1971 budget?

What revisions took place thereto?

Answer. Early in our budget preparation period, we were given a ceiling for our fiscal year 1971 budget by the Office of the Secretary of Defense. While the ceiling was in the form of recommended appropriation and program levels, we were given the flexibility to adjust individual appropriation and program funding, so long as we remained within the total Navy ceiling. Several relatively minor revisions were made to our budget during the joint Office of the Secretary of Defense and the Bureau of the Budget review. On matters of major import we, along with the other Services, presented our case to the Deputy Secretary of Defense before he made final decisions on the major issues. The most significant reductions were made as the result of a downward adjustment of the Service ceiling by the Office of the Secretary of Defense. To meet the new ceiling we identified 41 ships for inactivation, closed or reduced the scope of some shore activities, and made the necessary reductions in personnel and related appropriations.

Question. Admiral, is my understanding correct that a fundamental Navy principle is "the maintenance of a balanced fleet"?

Answer. Yes, it is a fundamental Navy principle to maintain a balanced fleet. This means a fleet capable of carrying out the prescribed functions of the Navy, within the requirements of the national military strategy, in consideration of the capabilities of the other services, and with due regard to the enemy threat. The primary function of the Navy is to gain and maintain supremacy at sea and then exploit that control of the sea as required by strategic and tactical objectives. Consequently, the operating forces of the Navy are organized generally as follows:

Strategic forces, consisting of POLARIS submarines and constituting a major segment of the national nuclear strategic force.

Strike forces, consisting of attack carriers, missile cruisers and destroyers, which have as their principal mission, gaining and maintaining supremacy at sea and control of specific ocean areas as required by strategic and tactical objectives.

Amphibious forces, consisting of Fleet Marine Forces embarked in amphibious shipping.

Anti-Submarine Warfare forces, consisting of anti-submarine warfare support carriers (CVS), destroyers, ocean escorts, attack submarines, and land based patrol aircraft.

Support forces, consisting primarily of underway replenishment ships, and of fleet maintenance and support ships,

Question. In your opinion, was the Navy a balanced fleet with its 15 carriers and existing inventory of other ships prior to the large-scale inactivations that have taken place in the last 2 years?

Answer .Yes, when we take into consideration the specific commitments of the Navy required by our defense strategy, the total number of ships of all types in the fleet, and the funds available in the Navy's budget for manning, operating, maintaining and modernizing the fleet.

Question. Isn't it a fact that the vast majority of ships inactivated have been in the "support and escort" type of ships?

Answer. Yes, that is true. However, the inactivation decisions were based primarily on the criteria of age. Although the majority of ships inactivated were amphibious, support, and escort types, it must be remembered that these kinds of ships also constitute the majority of the fleet. The below table summarizes the fiscal year 1969 and 1970 major category inactivations which have taken place because of additional funding constraints. Generally speaking, reductions were proportionate to the number of each ship type in the fleet.

Туре	Number inactive	Average age	Percent of total
Carriers	3	24	13
ruisers	. 3 63	26 24	2:
Nestroyers	5	22	
Amphibious	45 11	25 16	28
Mine warefare	35	25	i

¹ Based upon end fiscal year 1968 force levels.

Question. Has this resulted in an imbalanced Navy in that the Navy organization and structure is heavily weighted towards aircraft carriers rather than other sea-going types of ships? Admiral Moorer said there are no major support ships in the FY 1971 request.

Answer. No, the balance of forces within the fleet, as pointed out previously, depends to some extent on the total number of ships in the fleet as well as the military threat which we face. There is no exact formula for the specific ratios of combatant ships to support ships, for example. The balancing of Naval forces is a matter of judgment. If the size of the Navy is decreased, then the balance is shifted toward the highly capable, multi-purpose, combatant ships which represent that part of the fleet which is chiefly responsible for carrying out the primary function of the Navy, to gain and maintain supremacy at sea.

Unless the Navy can defeat any threat to our free use of the seas, then none of the other functions of the Navy can be performed. The attack carrier is the principal ship in the surface fleet through which the Navy's function of control of the sea is exercised. That is because the carrier represents air power at sea, and history has demonstrated surface ships cannot survive without local air supremacy. The attack carrier provides this air supremacy. In fact, it is the attack carrier force which constitutes the margin of difference between the U.S. Navy and that of the USSR, and is the measure of our naval superiority. The carrier's aircraft provide the protective cover without which the other principal naval missions—anti-submarine warfare, amphibious operations, and logistic support—could not be conducted.

It would be pointless to maintain large ASW, amphibious, or logistic supply forces, unless we first have a striking force of adequate strength to assure that

these other naval forces can be employed.

In the event of a conflict, it is the striking forces which are the first to engage. These forces of carriers and surface combatants must be in a continuously high state of readiness, so as hopefully to deter, but in any case to defeat, a potential enemy. We cannot accept anything but first line ships and aircraft, capable of meeting the threat of Soviet arms technology, in our striking forces. To be second best is to be militarily defeated.

On the other hand, deficiencies in modern repair, replenishment and support ships result in decreased efficiencies, but primarily in a logistic rather than in a tactical sense. Additionally, they are more quickly and readily replaceable than combatant ships because in many cases they can be adapted from available commercial types. If we must take a reduction in numbers and in quality (as represented by new construction) then we must cut support ships first; however, this does not mean that a condition of imbalance exists.

In summary, the Navy's primary function is to gain and maintain supremacy of the seas, without which no other overseas tactical operation of the Army, Navy, or Air Force can be maintained. Combatant ships, principally the carrier, exercise this function. It would be poor logic to first reduce those forces which are essential to the operations of all other naval surface forces.

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Question. In order to maintain a balanced Navy do you not feel the number of carriers should be modestly reduced?

Answer. At a certain point in the reduction of our total active fleet, yes. Obviously, we cannot have a Navy consisting of a carrier fleet which cannot be properly supported, and disregard the requirements of the other functions of the Navy such as to provide proper amphibious lift for the Marine Corps. However, this balance is a judgment factor, and further, it is a judgment which can best be made by the military commanders responsible for insuring that the U.S. Navy is capable of carrying out its functions in support of the national strategy.

For FY 1971, the Department of Defense has established the attack carrier force level at 15. Experience over the past five years has indicated that 15 attack carriers is an insufficient number to carry out the commitments of our national strategy as established by the JCS. In recognition of this fact, the DOD has authorized the Navy to use a CVS in a CVA role to raise the de facto attack carrier force level to 16. A force level of 15 CVA is a strain on our operating

forces but has in no way presented any problems of force imbalance.

Question. During our Tactical Air Power Subcommittee hearings we were advised that a new JSOP was being prepared as a result of the National Security Decision Memorandum No. 27 and the National Security Study Memorandum No. 3.

Would you explain briefly the guidance in the decision memorandum as to how it will affect the Navy and the Joint Chiefs in their considerations?

Answer. As I discussed in my prepared statement, the guidance from the President is clear in that it emphasizes increased reliance on our allies to supply the manpower for their own defense while the United States will furnish military and economic assistance when requested and as appropriate. Whether we refer to the so-called 1½ or 2½ war strategy, the enemy capability to challenge our control over the sea lines of communication has not changed, nor has the importance of these lifelines been diminished. As long as the United States has a coastline in both oceans, and as long as the major potential enemy has the capability to threaten the United States from either ocean, the United States will require the capability of a two-ocean Navy. For these reasons the new guidance simply confirms the requirement for the capabilities inherent in naval forces to support the military strategy recommended by the Joint Chiefs of Staff.

Question. Has the Navy received any decisions or guidance that would indicate that higher authority has ordered or is planning on the Navy having less than 15 carriers in the near or foresceable future?

Answer. For FY 1970-71, the Joint Chiefs of Staff (JCS) concluded, upon evaluation of the total requirements of the unified and specified commanders (only 2 of 8 are naval officers) that up to [deleted] attack carrier air wings could be needed, and that (VA requirements were in a range of [deleted]. The JCS recommended to the Secretary of Defense an objective force level of [deleted] attack carriers and [deleted] active attack carrier air wings. The Secretary of Defense made the final decision after consideration of all factors, including budgetary constraints, that a force level of 15 CVAs was sufficient to accomplish the objectives of the strategic concept with an acceptable degree of risk.

For FY 1972, the JCS determined the sea-based tactical air requirements to be [deleted] CVA/CVWs and established an objective force level of [deleted] CVAs and accompanying air wings. These decisions were based on the requirements of

the President's new mobility strategy.

In accordance with the new planning and programing procedures, the Office of the Secretary of Defense has provided the Navy with tentative fiscal guidance for FY 1972. Under the budgetary levels tentatively established for General Purpose Forces, the Navy would have to restructure and rebalance its forces in order to support more than [deleted] attack carriers and [deleted] attack carrier air wings. In view of the Soviet threat, such rebalancing may be prudent. Moreover, little diminution in CVA requirements is foreseen in FY 1972 in comparison to our current requirements, which are being met only by augmentation of the 15 CVAs by one CVS in a CVA role. Therefore, the Navy is continuing to investigate all possible alternatives to a reduction in the CVA force driven solely by fiscal constraints. I consider expedient measures to be fully justified by current

and future military requirements and the very pressing need for sea based tactical air in Vietnam. This latter situation is of particular concern. The enemy, with about 200,000 troops in country, still poses a significant threat. As our withdrawal increases, including land based tactical air, the dependence on the aircraft carrier for routine as well as emergency tactical air support will become heavy.

Question. In the balanced fleet structure which the U.S. maintained for a number of years, great emphasis was placed on anti-submarine warfare involving many surface ships and special ASW carriers, all trained and capable to act together. Yet it is true, is it not, that the ASW force and particularly the carriers have been reduced in recent years! In the light of this how would the Navy support sustained ASW operations in both the Atlantic and the Pacific simultaneously!

Answer. It is true that the U.S. Navy has long maintained, and desires to continue the maintenance of, a balanced fleet structure which recognizes the critical importance of antisubmarine warfare. To that end, we will continue to develop and improve a mixed force of ASW systems whose combined capabilities we believe essential to meet the threat in all its environmental and tactical variations. Our [deleted] improved land and sea-based ASW aircraft, new nuclear attack submarines and surface combatants are, and will continue to be, the basic and complementary platforms which make up our antisubmarine warfare forces.

It is also true that our ASW forces have been among those most affected by recent and recurrent budget reductions. By the end of FY-70, a total of 6 antisubmarine warfare support (CVS) carriers will have been decommissioned (three because of programmed inactivations and three because of budgetary restraints). With two CVAs having been redesignated as CVSs, the net CVS force levels will have been reduced from 8 to 4. The force reductions were dictated by fiscal cuts. To reduce expenditures to the required level and still retain balance with the Department of the Navy and the fleet force structure, it was necessary to put out of commission a certain number of carriers. The oldest and least capable ships were selected for inactivation. These were CVSs of the original Essex design which do not have steam catapults or the arresting gear required to operate modern tactical aircraft. These ships cannot be used in the role of an attack carrier. On the other hand, the Essex design attack carriers retained in the fleet have been extensively modernized and equipped with steam catapults and other improved features. Any attack carrier can be used for ASW if the strategic or tactical situation should require. The decision to reduce CVS force levels versus CVAs within the total number of carriers was based on the current and pressing requirements of the war in SEAsia. The Navy has a requirement to maintain 4 CVA in the Seventh Fleet (it was 5 until 1969). A force level of 15 CVAs has proven inadequate to support the total CVA commitments under less than mobilization conditions. Therefore, the Department of Defense has authorized the use of a CVS operating in the CVA role for the duration of the war in SEAsia. Should the relative priorities between ASW and the tactical air mission shift toward the former, then CVAs are available for redesignation or employment as CVS.

When major force reductions were announced last year, the Secretary of Defense stated that the result would necessarily be a lessening in our ability to meet our total defense commitments. It is not possible to reduce operating forces without a reduction in combat capability.

Neither before nor since the recent reductions have our forces been considered sufficient to conduct sustained ASW operations for an extended period simultaneously in the Atlantic and the Pacific. Our forces were not sufficient either qualitatively or quantitatively to do so.

Overtion. In addition, how would you maintain security on the sea lanes of communication?

Answer. The primary functions of the U.S. Navy include "to gain and maintain general naval supremacy, to control vital sea areas and to protect vital sea lines of communication." Soviet submarines, particularly those equipped with cruise missiles, represent the major, but not the only, threat to our supremacy at sea today. Soviet surface and air units armed with cruise missiles consitute a formidable threat to our continued free use of the seas. These forces as well as the Russian submarine threat must be contained if the security of the sea

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lines of communications are to be guaranteed. Both naval striking forces and ASW forces would be required to maintain the security of our sea lanes in a confrontation with the USSR. Carrier aircraft would strike hostile submarine, air, and missile bases from which attacks against our forces at sea could be mounted. These carrier aircraft would also attack hostile missile-equipped surface ships and destroy missile-carrying aircraft in the vicinity of friendly naval forces and shipping. Carrier based fighters would provide escort for the overseas logistics aircraft. Anti-submarine warfare forces would provide protection against submarines and at the same time be provided protection against hostile air and surface forces by the strike units of the fleet. Protection of the vital overseas lines of communications is the combined mission of many kinds of naval forces operating against the enemy in a coordinated effort and providing mutual support.

Question. Mr. Secretary, you indicated in your statement several times the severe personnel situation confronting the Navy.

What impact would the abolition of the draft have on the Navy in your opinion?

Answer. The Navy, as you know, considers itself to be a basically all volunteer force. We have resorted to the draft only twice since the Korean War for brief periods in 1956 and in 1965. However, in reality, the Navy can legitimately be termed a volunteer force in only a technical sense. Our capability to recruit personnel has historically been sensitive to draft pressure. During periods of high draft calls we have enjoyed a favorable recruiting climate in obtaining the high quality people we need. The reverse has been true in times of low draft calls.

Based on the Navy's experience in recent years, there is little doubt that the abolition of the draft would have a potentially serious effect upon the Navy's recruiting effort. The degree of this harmful effect is more difficult to judge precisely. A recently completed Navy survey which supports this conclusion indicated that about one-half of our enlisted and officer personnel would not have entered the service had there been no draft.

It is likely that the abolition of the draft would have a less marked negative effect on recruitment for the Naval Academy. Our investigations have shown that Midshipmen attending the Academy are most often motivated by reasons other than the draft. Likewise, we expect there would be a relatively small effect upon our NROTC scholarship program resulting from an absence of draft pressure. However, the application trend for the NROTC has been downward since 1966 as the favorable competitive position previously enjoyed by the Navy with this program has been diluted by the increase in the number of other student scholarships and financial assistance available. Also, the anti-military attitudes that have grown throughout the country in the last several years have been a major factor contributing to this trend. Other officer producing programs such as the Reserve Officer Candidate School for surface officers and Aviation Officer Candidate School are likely to be in more serious trouble if the draft were to be abolished. With respect to attracting required number of doctors and lawyers, I believe the Navy would have a nearly impossible problem if there were no draft.

Question. Even with the draft, is it not a fact that the Navy today is having extreme difficulty in retaining qualified officers and enlisted men! As Secretary Chaffee stated, "We are in far deeper trouble in this area than most people acknowledge." Please comment.

Answer. Yes, the Navy is having extreme difficulty in retaining qualified officers and enlisted men. In the officer corps, specifically the unrestricted line warfare specialties, retention rates have shown a steady decline during the past several years. By the end of FY70 the retention rates for Naval Aviators and Nuclear Submarine Officers will have dropped in excess of 50% since the end of FY66. Although the lowest retention rates are experienced by officers com-

missioned through the various reserve programs, OCS, AOC, etc., the regular officer sources, USNA and NROTC(R) are also showing declining retention of officers who enter the Unrestricted Line Communities upon commissioning. The projected retention rates for the end of FY70 are: Surface Line Officer—17%, Nuclear Submarine Officers—36%, and Naval Aviators—25%. These figures indeed reflect the difficulty the Navy is having in retaining qualified officers.

The enlisted retention problem confronting the Navy is also critical. With the exception of one small upsurge, Navy first term reenlistment rates have declined steadily since 1962. This problem is better illuminated by noting that rates have dropped from just short of goal to a position in FY 70 fully two thirds below desired levels. The most serious implication of this shortfall is that retention deficiencies must be filled by increased recruit enlistment and increased formal training. These poor alternatives to retention are extremely costly and wasteful of manpower for a service vitally concerned with cost effectiveness. In addition to first term deficiencies, equally as troublesome a problem is the loss of trained and experienced petty officers at the second term level. Loss of these petty officer leaders seriously effects the quality of the Navy product. This loss can be counter-balanced by increased recruiting and training of the younger men but it takes years to give them the experience to be able to fill the vacated billets. In this regard, as the pressure of the draft decreases, recruiting will become more difficult. Although the Navy receives almost no manpower directly from the draft, recruiting has been aided by this pressure placed on draft-age men. In addition, a percentage of men deliberately choose Navy enlistment to allow fulfillment of personal plans and timetables.

Question. What are the 3 new cruise missile systems for surface and submarine deployment that you mention on page 5, Mr. Secretary, which became available for operational use last year?

Ansicer. [Deleted.]

Question. Admiral you stated with reference to the threat that hard intelligence is available in several important areas.

What are the [deleted] new types of models and fighter aircraft you mentioned on page 14, and what recent intelligence do you have?

Answer. [Deleted.]

Question. What information do you have about series production on the Foxbat interceptor?

Answer. We believe that the Foxbat is in series production. About [deleted] have been produced to date.

Question. What can you tell us about the deployment of the Flagon-A interceptor?

Answer. The Soviets have deployed [deleted] of their point defense interceptor Flagon A's in Fighter Aviation of Air Defense. Their deployment around the peripheral areas of the USSR [deleted].

HARRIER UNIT COST

Senator Symington. You give us a figure on Harrier cost, total program cost, of [deleted], with an average program unit cost of \$5,500,000. Is that figure of \$5,500,000 based on British costs or cost of the McDonnell Douglas Co.

General CHAPMAN. That is the latter, based on the U.S. production.

Senator Symington. \$51/2 million.

General Chapman. 5.47 is the figure I have.

Senator Symington. Now, what would the cost of those airplanes

be if you bought them all abroad, from the British company?

General CHAPMAN. The total cost, if we got them from the British, in a 4-year plan which was our original program would be, for [deleted airplanes, \$386 million.

Senator Symington. \$386 million.

General Charman. Under a 5-year British program the cost is—I will get that for you.

Senator Symington. What is the difference between 4 years and 5

years?

General Charman. The plan we submitted last year was for a

4-year buy of the [deleted].

When we were directed by the Congress to shift to U.S. production, the plan that was worked out was a 4-year plan, 4-year phase-in plan into U.S. production which added to the first year, 1970, made 5 years all together.

A comparable British plan would be a 4-year plan tacked onto the

first year for a total of five.

Senator Symington. Then what is the 5-year cost in the British plan?

General Charman. It is \$514-odd million.

I will get you the exact figures. It is about \$110 million less than the U.S. 5-year plan. Senator Symington. \$110-

General CHAPMAN. \$110 million, approximately.
Senator Symington. What is the difference between the \$110 million

and the \$237 million, with respect to the British cost?

General CHAPMAN. The additional year of production. It is the same number of airplanes spread over an additional year, so that the factory and the labor costs and all the rest of it are naturally 1 year's worth higher.

Senator Symington. Would you not rather buy the planes from the

British than you would from the United States?

General Charman. I think there are advantages to phasing into U.S. production, Senator. There is the great advantage of moving this very unique and I think very valuable technology to this country. plus the fact that in wartime then we would have complete reliance on U.S. production for spares and support.

Senator Symington. Let's take it on an even basis, a 5-year plan in both cases. What is the reason for the difference the \$110 million extra

cost over here.

General CHAPMAN. It is partially in the labor rates. The bulk of the costs, about \$58.1 million, is required to transfer and establish production in the United States and for royalties. Increases in the cost of direct manufacturing labor total only \$12.2 million. The remaining cost differences result from Americanization of electronics systems and other Government furnished equipment which would not result if production remained in the United Kingdom.

Senator Symington. There was previous talk about labor rates today. We know we can buy for less money abroad. The only trouble, there would not be any income left over here as the source for the taxes that keep our country going. I have just been over some figures with respect to Germany. Last year the Germans put 4.4 percent of their gross national product into national defense, despite the fact that, along with Japan, they are other two richest countries of the Free World. That 4.4 percent is considerably less than France or Great Britain. We put into our national defense over 8 percent of our GNP; and the European cost to us is \$14 billion a year to protect Europe. The German mark is probably the strongest currency in the world today. The United States had a little to do with first the resuscitation of Germany and then their tremendous prosperity. At the same time we are now having serious problems with the value of our dollar. Nevertheless we continue to put in around 8 percent, into defense, of our GNP; France and England, 6.6, the Germans, 4.4. How can we continue with any such policy if we don't, through production, create the necessary tax base?

I am glad to see this concept of VTOL cut into the picture. I have been for it for 20 years. We haven't any. The Russians are flying one. Not only that, they are flying two mach two and a half STOL's. We have nothing like that either. The Harrier combines both, so I

think it is a very good idea.

You made a statement about the difference in labor costs. I would like to know what the comparative differences are, so we can understand.

General Charman. I can furnish you the exact comparable rates for the record.

Senator Symington. If you would.

General Chapman. As they have been reported to us by the Air Systems Command.

Senator Symington. If you would put the rates in. Are they the

only differences you know of?

General Chapman. No. There are other differences. There are the costs of the premiums, the royalties, and there are other points or costs.

Senator Symington. Would you segregate those—obviously you are going to hold up production if you switch to American manufacture: extra costs incident to the delay so I would rather work from the \$110 million to get a realistic figure. Would you segregate the details of the \$110 million extra cost?

General CHAPMAN. Yes, sir.

Senator Symington. Royalty, parts, labor rates, all of it.

General CHAPMAN. Yes, sir, I will.

Senator Symington. Then we will know the full story.

I have no further questions. (The information follows:)

Procurement of [deleted] Harrier aircraft could be effected over a total five year period by procuring the aircraft either through the United Kingdom or by transitioning production to the United States. Since 12 aircraft were procured with FY 1970 funds in the amount of \$57.6 million, [deleted] aircraft remain to be procured to complete the Marine Corps objective for this aircraft. The following table compares procurement costs using the U.S. licensee, McDonnell Dougles Corporation, and procurement costs buying solely through the United Kingdom.

COMPARISON UNITED STATES/UNITED KINGDOM PRODUCTION COSTS

United States	Fiscal year 1971	Fiscal year 1972	Fiscal year 1973	Fiscal year 1974	Total
Number of aircraft	18. 0 76. 0	[Deleted]	[Deleted] 128, 8	[Deleted] 102. 6	[Deleted] 436, 3
Support	76. U 20. 2	120. 9	17.8	3.5	60. 1
Spares	15. 2	19. 5	20. 1	15. 0	69.8
Advance procurement (difference)	6. 9	9. 6	-3.3	-13.2	
Total	118. 3	176, 6	163. 4	107. 9	566, 2
United Kingdom	Fiscal year 1971	Fiscal year 1972	Fiscal year 1973	Fiscal year 1974	Total
Flyaway	51. 8	92.4	99. 1	85. 5	328. 8
Support	20. 2	14. 6	15. 9	7. 0	57.7
Spares	15. 2 10. 0	19. 5 1. 1	20. 1 -3. 1	15. 0 8. 0	69. 8
Total	97. 2	127. 6	132. 0	99. 5	456. 3

COST DIFFERENCES

[In millions]

	United States	United Kingdom	Difference
Fiyaway Support Spares	\$436. 3 60. 1 69. 8	\$328. 8 57. 7 69. 8	\$107. 5 2. 4 0
Total	566. 2	456. 3	109.9

Flyaway.—The difference of 107.5M results from the following costs associated with the U.S. Program.

AIRFRAME 703M

9.6M in Royalties paid by MDC which would not be paid if the aircraft were manufactured in the U.K.

27.1M for production and assembly tooling to establish the capability for

manufacturing the aircraft in the U.S.

12.2M increase in the cost of direct manufacturing labor. This increase results from the fact that MDC will perform one half of the manufacturing labor for the [deleted] aircraft. The U.S. composite labor rates are higher than U.K. rates by \$3.40 per hour.

21.4M increase attributable to additional recurring and sustaining engineering labor required to transfer and establish production in the US. This additional labor cost includes 4.6M for planning, 9.7M for tooling labor, and 7.1M inspection and sustaining engineering; none of which would be required if production remained in the U.K.

Electronics.—The increase of \$19.4M in electronics costs results from the Americanization of the Ferranti Nav/Attack system by Northrop. As for the airframe, these costs result from royalties, tooling, labor rates and added engineering requirements. Were production to remain in the U.K., this increment of electronics costs would not be required.

Other GFE.—The increase of \$17.8M in other GFE results from Americanization of the role equipment and instruments. This increase would not be required,

if production remained in the U.K.

Support.—The difference of 2.4M results from the requirement to buy organizational and intermediate support equipment for the U.S. manufacturers plant. It should be noted that both the U.S. and the U.K. programs include the establishment of 3rd level (depot) maintenance capability in the U.S. This capability was not included in the original program presented to Congress during the FY 1970 budget hearing.

Spares.—Spares costs are the same for both the U.K. and the U.S. programs. In the case of the U.S. program, the spares cost is 15.8% of flyaway, which is a normal budgetary estimate for investment spares. In the case of the U.K. program, spares cost is 21% of flyaway. This increased level of spares is required because of the location of the prime contractor in the U.K., resulting in lengthened supply and communications lines.

Senator Symington. I have just finished my questions, Mr. Chairman, and appreciate your coming back.

Chairman Stennis. You had finished asking your questions about

this F-14?

Senator Symington. I asked if we could have a breakdown of the reasons for the differences in the cost of American production as against British production on the Harrier.

Chairman STENNIS. You had already asked questions about the

cost of the F-14?

Senator Symington. Yes. And I asked unanimous consent that a group of questions be inserted in the record for reply.

Thank you.

Chairman STENNIS. Thank you, Senator.

I am glad you could come. And remember tomorrow afternoon, if you can, for 30 or 40 minutes.

Senator Symington. What time do we start?

Chairman STENNIS. 2:30.

Senator Symington. Thanks, Mr. Secretary, Admiral Moorer, and General Chapman.

NAVAL HOUSING

Chairman STENNIS. Gentlemen, on this question of housing, I think the committees have always put in almost everything that is in the budget. I have thought a lot of times about the special problem the Navy has in connection with housing, tour of duty at sea, and so forth.

I believe you said you had a deficit there of 60,000 units of naval

family housing.

Now, the figures we have, Mr. Secretary, from the Office of the Secretary of Defense, considers that there is an overall deficit of family housing for all services of about 117,000 units and they have a 5-year program to build 55,000 units. If it is just 117,000, you account for more than 50 percent of the total deficit.

Secretary Chaffe. Yes, sir; as I say, I am not familiar, Senator, with the Defense requirements, but the 60,000 are ours as we worked

them out. As you say, it is over 50 percent.

Chairman Stennis. In terms of rank, who is the first eligible man

in the Navy for a house?

Secretary Chaffee. He is an E-4 with more than 4 years of service. Chairman Stennis. That is the first grade of a lower echelon of petty officer, is it not?

Secretary Chaffe. Yes, sir.

Chairman STENNIS. And that is part of your inducement. On that basis what deficit do you have?

Secretary Chaffer. That is the basis on which we come up to the 60,000.

Chairman Stennis. All right. How many are in the bill for this year for the Navy?

Secretary Chafee. 3,500 plus 200 [deleted], 3,700.

Chairman STENNIS. Well, it will take a long time to get 60,000 units at that rate.

Secretary Chaffe. Yes, but if we get the 3,500, as I previously said, it will be the largest number Congress has given us since the end of

World War II. We would be very grateful for these units.

Chairman Stennis. At a time when we were talking about something else over in the office, you got talking about housing and you impressed me very much. When you figure this 60,000 now, that is a

house for everyone that is E-4 or above, right?

Secretary Chaffee. There is a formula in which they figure out what housing there is available within commuting distance of bases, at a reasonable price and of a decent type. They use this formula. So these 60,000 units would not—isn't what we require to house all our people because some of our people will be housed on the economy in reasonable housing at a reasonable price.

Chairman Stennis. Well, I think you ought to have some margin there to be housed on the economy. You have to have some margin for change in personnel, too, ups and downs of personnel. Do you have

those margins in there, too?

Secretary Charge. Yes, sir. In other words, if by a wave of the wand we got the 60,000 units, that would not mean that every Navy man would be in Government housing.

A family housing deficit of 60,000 units was developed from data collected after a tabulation of questionnaires received during a survey conducted as of 31 January 1969. This survey was made to develop the supporting data for the FY 1971 Program. The recent establishment by OSD of a new, higher scale of Maximum Allowable Housing Costs was applied to the results of this survey,

reducing the deficit to approximately 53,000 units.

A survey involving questionnaires reporting the housing conditions under which military families are living is conducted each year. This survey determines the extent and quality of the family housing utilized by and the vacant adequate private housing available to servicemen and their families. The computed deficit is derived from a gross requirement for eligible personnel with dependents, based on the long-range projected base loading of the installation or complex. To arrive at the maximum number of units which can be requested, a 10% safety factor (20% in foreign areas) is applied to the gross requirement for eligible personnel. From this adjusted gross requirement are deducted the adequate military housing existing and approved, the adequate private housing utilized by military families according to the questionnaires, and the adequate vacant private housing found to be available in the community. The number of vacant housing units is determined from an assessment of the vacant dwelling units listed at the Station housing office, advertised in the leading area newspapers, from local real estate organizations, the FHA and VA. Those units which meet the OSD criteria of cost, condition and distance are considered assets in deriving the deficit of family housing.

FIIA HOUSING REPORT

Chairman Stennis. All right. Now, you have given an illustration about the 1968 FHA report, average monthly civilian housing costs, using \$213 for the Washington area. Just what meaning do you give this?

In other words, do you consider this to be the average monthly rental in this area or what it costs a person to buy a house, including principal and interest and taxes?

Secretary Charge. No. This would be total cost to a home buyer for an average house which I suppose has a couple of bedrooms and bath, kitchen, and so forth.

Chairman STENNIS. Well, does it really run that high now on the average, or is it average meaning the top half and the lower half all added together to strike a medium there?

Secretary Chaffe. Well, I think for decent housing, you know,

nothing too fancy----

Chairman STENNIS. All those below \$213 woud not be inadequate, would they? I mean you get decent housing for less than that. Many of them do it.

Secretary Chafee. Well, in Washington, with a couple of children, I think that it is awfully difficult.

(The information follows:)

The Federal Housing Administration annually surveys housing costs in the United States. Survey data is compiled from FHA loan application information for purchase of either new or existing homes during a given calendar year. For the year 1968 the average reported housing cost, including payments of principal, interest, taxes, insurance, utilities less phone, and maintenance costs, for existing homes was \$169.55. This expense was the average amount paid for the listed housing costs by all individuals of any income group purchasing an existing home with an FHA loan during the year 1968.

As part of the same survey, the FHA also provides regional costs data on 122 Standard Metropolitan Statistical Areas (SMSA), including all the major metropolitan areas with populations in excess of 50,000 persons. On the basis of this survey of 122 SMSAs, 34 metropolitan areas were shown to exceed the nationwide average housing cost of \$169.55 in 1968. The average cost in the Washington, D.C. SMSA, which includes the District of Columbia, Prince Georges and Montgomery Counties in Maryland and Arlington and Fairfax Counties in Virginia was \$213.17 in 1968, or 25.7% higher than the national average cost. This does not mean that an individual must pay \$213.17 in Washington in order to be adequately housed; it merely indicates that housing costs in the Washington metropolitan area, are, on the average 25% higher than the national average.

In order to determined the expected housing cost for a particular individual, it is necessary to enter the FHA survey data by income groups. For example, an E-6 in the military receives a monthly "salary" comprised of basic pay, allowances for quarters and subsistence, and the tax advantage on the two non-taxable allowances, of approximately \$640. FHA data reveales that the median housing expense for individuals earning this much monthly income averages \$150. Therefore, in an average cost housing area such as Des Moines, Iowa, where the average cost of housing is \$169.50, the typical E-6 could expect to find adequate housing appropriate to his income level for \$150 per month. On the other hand, in Washington, D.C. he would have to pay approximately 25% more to obtain ade-

quate housing, or about \$187.50 per month.

These figures are, of course, approximations, as they represent the median housing expenses for individuals in given income groups, and do not reveal either necessity for larger houses due to large than normal family sizes or preference for more economical housing in order to afford other items such as cars, television, etc. It should be noted, however, that these are all conservative estimates. In addition to being median, or 50th percentile, cost for existing housing which is less expensive than new housing, they are based upon data from the 1968 FHA survey. Recognizing that the Shelter Component of Consumer Price Index has risen 9.4% between December 1968 and January 1970, it is easy to see that the above housing cost data based upon the 1968 FHA survey are now considerably out of date.

PREPARED QUESTIONS FROM SENATOR THURMOND

Chairman Stennis. Well, this will be heard by a subcommittee on construction, you see, that goes into these things more.

Here is a set of questions from Senator Thurmond that I will put in the record for him and ask you gentlemen to respond. These are addressed to Admiral Moorer, some to the Secretary, too.

(Questions submitted by Senator Thurmond. Answers supplied by the Department of the Navv.)

Question. Admiral Moorer, you state that the Navy has found it necessary to introduce, on a compressed time scale, several new ship and aircraft programs previously deferred.

What programs fall in this category? As I understand it, the Navy attempted to compress the time schedule on the MK-48 torpedo program with unfavorable results.

Do you believe it wise to rush these complex programs when the results to date hav not been good?

Answer. The statement to which you allude, Senator Thurmond, appears on page 3 of my prepared remarks and addresses the basic Navy problem of modernization in a much larger context. For a variety of reasons, but particularly due to the heavy expenditures to support operations in Vietnam, many necessary modernization programs were continually deferred during the decade of the 1960's. To cite but a few examples: a replacement program for our aging World War II general purpose destroyers is long overdue and will be of major proportions due to the large number of ships reaching the end of their service life in the 1970's; a replacement of the F-4 aircraft, delayed by the abortive F-111B program, is also overdue and urgently required to keep abreast of the Soviet air threat; a new generation sea-based ASW aircraft is necessary to introduce available new capabilities to counter the continually growing Soviet submarine threat to our vital sea lines of communications in the broad-ocean areas; and finally, there is the POLARIS/POSEIDON conversion program which is vital to the policy of strategic nuclear sufficiency.

The compressed time scale to which I referred addressed the necessity to undertake these major programs concurrently rather than in phased sequence over a period of years in order to modernize the Navy sufficiently to meet the increasing Soviet threat. For as I indicated in my prepared statement, the problem of balancing modernization needs against adequacy of forces in being is one of the most difficult ones the Navy must face under austere budgetary

constraints.

I did not mean to imply, Senator Thurmond, that the individual modernization programs must be pursued on an imprudently compressed time scale, although it is certainly true that the longer they are delayed the greater the risk becomes due to the sustained momentum behind the Soviet development and production efforts. I can assure you that in the four major modernization programs I cited above, the Navy does not intend to proceed faster than amply justified by our developmental progress.

Question. You state that you are requesting funding for the conversion of six more POLARIS submarines to carry POSEIDON. The Navy figures indicate that these conversions will cost about \$436 million.

I have been advised, however, that the Navy considers about two-thirds of these funds to apply to the recornig and overhaul of these vessels.

I also understand that overhaul costs do not normally require authorization by this committee.

Can you explain why the Navy is classifying overhaul costs as conversion and requesting authorization for these funds?

Answer. It is Navy policy when converting a ship to consider all of the cost of conversion in one line item as one project in the shipbuilding and conversion appropriation. This is a part of the description of the title of that appropriation. If the ship were overhauled at a separate time for a separate purpose, then the overhaul of that ship would be a charge against the operations and maintenance appropriation.

Question. Admiral, the Navy is requesting funds for additional DD-965 destroyers in the FY 1971 budget. Much has been written to date about the cost growth on this program even though, as I understand it, there is yet to be a contract awarded.

Would you explain briefly, so that the committee will be aware of the situation, the reasons for the increase in the cost estimate and how it affects the program?

Answer. The increase in the cost estimate of the DD 963 program is attributed to two causes. The first is the increase due to estimating factors—that is, increases in labor and material costs and changed data base reflecting recent ship cost returns. The second is the effect of shifting from an estimate on the

notional ship to the estimate based on the contractors' proposals.

Because the price proposals from the contractors were adjudged high, the Navy has deliberately taken additional time on the DD 963 program in order to insure the most realistic contract award from the point of view of cost, schedule, and feasibility of production. We will be ready to award the contract in April immediately following source selection.

Question. I understand that the Navy's schedules for the CVAN carriers and the SSN-688 submarines will or have already slipped beyond the schedule initially programed. Can you tell us how much slippage in the schedule is expected and how this will affect the program cost and the Navy's needs?

Answer. In regard to the Nimitz and the Eisenhower, as discussed earlier in the testimony we expect that the ship delivery schedules may be delayed about a year due to late delivery of some nuclear components. The Navy is working with the shipbuilder to arrange the shipbuilding schedules so as to build both ships at minimum cost. The possible increase in costs due to the potential delays is not known at this time.

Until Nimitz is completed, it will be necessary for the Navy to continue in service the World War II design carrier it is scheduled to replace. The performance of the World War II carrier is limited to older aircraft types which are

still compatible with its facilities.

In February 1970, during the review of the SSN 688 Class program by the Defense Systems Acquisition Review Council, the Navy advised the Department of Defense that the effect of lack of BRICKBAT priority and impact of the General Electric Strike had already resulted in an irrecoverable delay in the SSN 688 Class Program of eleven months for each ship of the class.

The Navy has advised the potential shipbuilders of the delayed schedules for the SSN 688 Class. Shipbuilder proposals are expected in May 1970. The Navy cannot precisely determine the dollar impact associated with the delayed schedules; however, any delay in these urgently needed submarines postpones the Navy's ability to counter effectively and fully the rapidly expanding Soviet submarine threat.

Question. I understand that the slippage in the SSN-688 program is related to the failure to receive a priority (BRICKBAT) rating for this ship. If this is so, does this mean that the requirement for these submarines is not considered urgent enough to obtain a priority over other systems?

Answer. In view of the urgent need to deliver the SSN 688 Class submarines to the Fleet at the earliest possible date, the Navy has repeatedly attempted to obtain a BRICKBAT priority for the SSN 688 Class.

The Assistant Secretary of the Navy (Installations and Logistics) submitted the Navy's initial request for BRICKBAT priority for the SSN 688 Class Submarine Program on 6 January 1969. This request was denied by the Depart-

ment of Defense.

The Secretary of the Navy stated on 17 September 1969 in the Navy's second request for BRICKBAT priority for the SSN 688 Class Submarine Program: "Our SSN 688 Class Submarines must go to sea in the shortest possible time in order to maintain our qualitative superiority in submarines and to counter the Soviet submarine force. . . Only a BRICKBAT (priority) assignment can produce this new class submarine within the ordered time frame."

On 19 March 1970, the Deputy Secretary of Defense recommended to the President that BRICKBAT priority be approved for selected items for the lead

ship (SNN 688) only.

Question. The GAO report on the Status of the Acquisition of Selected Major Weapon Systems states that the P-3C aircraft were being delivered without its major ASW avionics system, the DIFAR, and that schedule slippages would recur in this program.

Can you tell us how this has affected the program and what additional costs will result to the Government from these delays?

Answer. The DIFAR system is currently in the process of being installed in those P-3C aircraft previously delivered to the Fleet without this capability at no additional cost to the Government. [Deleted] systems have been installed at this time and all P-3C aircraft delivered to the Fleet will be DIFAR equipped by [deleted] VP-49 which is the first P-3C squadron scheduled for deployment is expected to deploy [deleted] on schedule with its full DIFAR acoustic system installed. Although the P-3C was delivered to the Fleet initially without the DIFAR installed, the Fleet has been able to use the available aircraft time to their good advantage for valuable training in the many other systems aboard the aircraft.

Question. You state that the S-3A aircraft program is considered a lone-risk program. I have noted, however, that the Navy is estimating about \$616 million for the R&D under this program.

This seems like an auful lot of money for a low-risk program. Can you ex-

plain why so much R&D funds are required in a low-risk program?

Answer. R&D funds for the S-3A include a completely new integrated avionics system, oriented around a new light weight high-speed, sophisticated, general purpose computer, a brand new high by-pass jet engine, as well as the S-3A airplane itself. None of the individual components of the program are considered to have much risk attached to their development. Even the integration is considered well within the state-of-the-art. The cost comes from the fact that there are a large number of new items involved, with considerable know-how and labor necessary to integrate them into an effective whole.

Question. You state that additional R&D is being performed in the ASW area, to improve the sensor capabilities. Will the S-3A aircraft have the most modern sensors available or are there plans to incorporate the sensors under development into the S-3A?

Answer. The S-3A program itself is developing its own sensor package. This is necessary because these sensors must be integrated with a computer in order to perform according to plan. When delivered the S-3A will have the most advanced ASW sensor package available and will represent the efforts of over nine years of development work by the Navy.

The APS-116 airborne ASW Radar is being developed under a separate project. While this radar is contemplated for the S-3A as Government Furnished Equipment, it will be available for use on other aircraft as well. Various sonobuoys are also being developed which will be employed by the S-3A as well as

other ASW aircraft.

Question. Admiral Moorer, the Navy says it plans next year to decide between the MOD-0 and MOD-1 MARK-48 torpedoes. How can this be done when one is a single purpose and the other a dual purpose torpedo?

Answer. It is more accurate to say that the Navy plans to decide between the Westinghouse Mod 2 and the Clevite Mod 1 torpedoes. There are three versions of the MK 48 torpedo: The MK 48 Mod 0, which is primarily for ASW; the MK 48 Mod 1 which is a dual purpose torpedo; and the MK 48 Mod 2, which is also a dual purpose torpedo.

The MK Mod 2 is essentially a MK 48 Mod 0 torpedo with a [deleted] to make it more effective in the anti-surface ship role. Consequently, the performance of the MK 48 Mod 2, particularly in the ASW role, will be in large measure de-

termined by the performance of the MK $48\ \text{Mod}\ 0$.

Actually, our plans call for testing and evaluation of all three torpedoes through FY [deleted]. Several production prototype models of the Mod 0 will be converted to production prototype models of the Mod 2 for these tests. Much of the testing and evaluation of the ASW capability of the Mod 2 will be accomplished in the test and evaluation of the Mod 0.

Question. Is it safe to base a key program decision such as this on a significant modification change such as the MOD-2 torpedo would entail? Would not such a decision delay the receipt of this needed torpedo in the fleet?

Answer. Because the decision will be based upon the results of comprehensive tests and thorough technical and operational evaluations of the Mod 2 as well as the Mod 0 and Mod 1, we believe that we will be on firm ground when the decision is made.

Although we will not select the torpedo that will be procured in quantity until we complete the testing and evaluation, now scheduled for the end of FY [deleted] we are proceeding with limited initial procurements of both the Mod 0 and the Mod 1. We are doing this because of the urgent need for the weapon in the fleet. Quantity procurement of either the Mod 2 or the Mod 1 will commence in FY [deleted] after the choice is made. The limited initial procurements will provide realistic cost, schedule, and producibility information prior to the

commitment of large funds for quantity procurement. The total number of torpedoes to be procured before selecting the best weapon is small [deleted] in comparison to fleet needs. However, it will serve to introduce the improved capability into the fleet and permit the initiation of training in torpedo maintenance, handling, and tactical employment.

Question. Why do you need more MARK-48 MOD-0 [deleted] torpedoes than MOD-1's [deleted] to make the decision between these two models?

Answer. We have bought [deleted] Mod 0 production prototype torpedoes and 40 Mod 1 production prototype torpedoes. [Deleted] of the Mod 0 production prototype torpedoes will be converted to Mod 2 development prototype torpedoes. 15 Mod 0 production prototype torpedoes will be converted to Mod 2 production prototype torpedoes in FY [deleted].

The production prototype torpedoes will be thoroughly tested and evaluated, technically and operationally. We require fewer Mod 1's because we were able to take advantage of the experience with the Mod 0 program, which was ahead of the Mod 1 program. Every effort was made to economize on requirements. Furthermore, since most of the ASW characteristics of the Mod 2 will have been evaluated in the Mod 0, we require fewer Mod 2 production prototype torpedoes, primarily for testing and evaluation of the anti-surface ship characteristics.

We are buying [deleted] Mod 0 torpedoes in FY 1970 for fleet use. The Mod 1 is not ready for procurement in FY 1970. In FY 1971 we plan to buy [deleted] Mod 0 torpedoes and [deleted] Mod 1 torpedoes. All of these are needed for fleet use. In addition, we will acquire realistic information on torpedo costs, schedules and productibility through these limited procurements, before we go into quantity procurements beginning in FY [deleted] after choosing between the Mod 1 and the Mod 2. (It is important to recognize that the results of the tests of the Mod 0 have a bearing upon this choice, since the ASW performance of the Mod 2 is expected to be the same as that of the Mod 0 upon which it is based).

By buying some Mod 0's in FY 1971 in addition to Mod 1's we will ensure that the production line viability of the Mod 0/2 contractor will be maintained, like that of the Mod 1 contractor, so that either one will be ready to continue the production line efficiently when the choice is made for the FY [deleted] procurement. Due to the different status of each Mod, it developed that [deleted] Mod 0's and [deleted] Mod 1's would meet thes needs.

Question. Why could you not make as sound a decision without buying the [deleted] additional MARK-48 MOD-0 torpedoes in FY 1971, especially in view of their cost of \$55 million which is well over [deleted] per torpedo?

Answer. These torpedoes are urgently needed in the fleet, and that is the reason for the procurement. Furthermore, if the Mod 2 is selected over the Mod 1, the Mod 2 torpedoes will be built initially on the same production line as the Mod 0. By keeping this line going with the [deleted] Mod 0 torpedo procurement, we avoid start-up costs that we would otherwise incur.

The cost of [deleted] Mk 48 Mod 0 torpedoes, unsupported, is about \$12.5 million. There is about \$29.3 million for support of production, proofing, warshot, and operational evaluation: and there is \$5.0 million for fleet and school training. In addition there is \$8.7 million for the production and evaluation of Mk 48 Mod 2, for an over-all total of about \$55.5 million.

Question. Mr. Secretary, compare the [deleted] now Soviet cruise misisle systems mentioned on page 5 of your statement with our own present and planned cruise missile strength.

Answer. [Deleted.] We have no cruise missiles such as the Soviets in our inventory. However, our current missile inventory and planned anti-ship weapons systems are as follows:

a. Present air-to-surface weapons have been examined for applicability against the cruise missile launch platforms. Only the CONDOR and STANDARD ARM missiles have sufficient range to enable stand-off attacks against SAM equipped Soviet surface ships without high risk. SHRIKE and WALLEYE stand-off ranges are adequate to avoid aircraft exposure to anti-aircraft fire only. [Deleted] BULLPUP with a range of 5 to 6 miles, requires visual conditions and is radio commanded by the pilot who must follow the missile until impact. SHRIKE and STANDARD ARM home on the radar emissions of the target ships,

[deleted]. However, these missiles can still have a significant degree of effective-

ness in combat, [deleted].

b. The existing 3T (TERRIER, TARTAR, TALOS) Surface Launched Weapons have a surface-to-surface capability, [deleted]. The follow-on Advanced Surface Missile System (AEGIS), now in Engineering Development, will have the potential for overcoming limitations [deleted]. However, the use of a SAM in a surface-to-surface situation will necessarily have a less-than-optimum warhead for such a role. We seek, therefore, to develop a surface-to-surface missile.

c. When developed, the HARPOON weapon system will provide both our ships and aircraft with an all-weather capability to attack Soviet surface craft of all types. This weapon will be compatible with patrol and ASW aircraft [deleted] and attack aircraft (A-6 and A-7), and with existing ASROC and 3T launchers on shipboard. [Deleted.] The maximum range of HARPOON [deleted] will provide our aircraft with stand-off ranges for low risk attacks on SAM equipped enemy ships. Our surface ships will achieve [deleted] capability against all enemy surface targets. The HARPOON system presently is in final phases of technological development prior to commitment to engineering development.

Question. Secretary Chafee, in your management comments you state that the Navy has taken steps to ensure that major developmental problems are resolved prior to production.

Yet I notice the Navy is asking procurement of the F-14 and the S-\$A while at the same time you are asking for hundreds of millions in additional R&D money for both aircraft.

Will you comment on this point.

Answer. As you recall, originally the first six F-14 aircraft (Lot I) were to be funded with R&D money and to be paid for over a period of four years. The next six aircraft, also for R&D, were to be fully funded with PAMN funds in FY 1970. However Congressional action provided additional funds in FY 1970 R&D to procure these aircraft. The \$274M requested in FY 1971 for R&D is to continue progress payments on the first six aircraft, continue development of the AWG-9 weapons control system, the TF-30P412 engine and to provide funds for field test stations. Additionally these monies will continue development of special support equipment and other Government furnished components.

ment of special support equipment and other Government furnished components. The \$658M requested in the FY 1971 budget under the PAMN appropriation is for twenty-six aircraft. The first eight of these are for Navy technical evaluation, Board of Inspection and Survey trials and for operational test and evaluation. These aircraft have to be representative of production articles, but in a sense are required in the development program. The remaining 18 aircraft in Lot III provide the fleet training aircraft to commence transition of current fleet squadrons.

The major development problems will have been resolved with the first 12 aircraft.

In the case of the S-3A six R&D aircraft were included in the FY 1970 RDT&E budget with the remaining two R&D airframes included in the FY 1971 PAMN request. While these two airframes are requested to be procured in PAMN the engines and avionics packages for them are being paid for out of RDT&E. Due to the low risk involved in the development of the S-3A aircraft these eight test vehicles are all that are required.

The justification for the procurement of the two S-3A's in the PAMN account in FY 1971 is that these two will be reconfigured as production aircraft and will spend the bulk of their service life with the Fleet.

The S-3A contract with Lockheed precludes the procurement of the first production lot (Lot III) until the aircraft is flown and the avionics package is successfully demonstrated in the laboratory.

Included in the FY 1971 PAMN request, in addition to the two airframes, is advanced procurement of support and the procurement of essential long lead items to enable production in FY 1972, 1973.

Question. Senator Stennis has reported a projected \$2.9 billion cost growth in the MARK-48 MOD-0 torpedo program. I expected you to mention this torpedd in your remarks. Has this program received your personal attention and, if so, what are your findings and recommendations?

Answer. I have given the torpedo Mk 48 program my close personal attention. We have had a well structured program providing competitive development to give us the best torpedo at the least possible cost. When we have made

a decision between the Mod 1 and the Mod 2 from the competitive development effort we intend to bring in, at the appropriate time, competition on the quantity procurement of the selected torpedo. This will enable us to get the selected torpedo at the least possible cost.

In the Mk 48 program we have followed the "fly before buy" concept. To date we have bought only those torpedoes required for testing and evaluation. We intend to conduct an extensive technical and operational evaluation before we commit ourselves to quantity procurements. In the meantime we intend to procure limited quantities of Mk 48-0's and Mk 48-1's to meet the urgent fleet requirement and to get more information on producibility and costs.

Our present intention is to begin quantity procurement commencing in FY [deleted] and continuing through FY [deleted] when we will achieve our planned inventory objectives. We will conduct annual reviews of the requirements for this torpedo to insure that we don't buy more than we need.

Finally, we have directed that a study be conducted to examine ways to re-

duce the cost of this urgently needed weapon.

In summary, Senator Thurmond, I believe we are doing everything appropriate to meet a critical need for improved ASW capability and to complete the dual purpose torpedo program. I certainly recommend that we continue the program as presently structured.

Question. What unit cost do you envision we will end paying for the MARK-48 torpedo?

Ansicer. The current estimate is based on the 31 December 1969 Selected Acquisition Report. It projects a production unit cost of [deleted] for the total program.

If we consider the total program cost over the [deleted] years from program initiation to achievement of inventory objectives, the total program cost per production torpedo, as distinguished from production unit cost, is [deleted].

Question. While this cost is high, when you consider potential targets a really accurate torpedo could be worth such prices. Do you feel the MARK-48 will be highly effective?

Answer. We are confident that the MK 48 will be highly effective, particularly in comparison with the effectiveness of the weapon it will replace, the MK 37. [Deleted.]

Question.—Secretary Chafee, would you comment on the basis of the Lockheed Corporation shipbuilding claims against the Navy?

Answer. In December 1968 and January 1969 Lockheed Shipbuilding and Construction Co. submitted nine shipbuilding claims in the amount of \$173.6M for a variety of ships as follows:

In millions of dollarsi

Fiscal year program	Ship type	Amount o claim
962	DEG 1-3	\$10.
963	DE 1048/1050	10.2
964	AE 22/24	
963	AO 106/109	6. 2
964-65	DE 1052 class	50. 7
962	AGEH 1	6.8
963–65	LPD 9-15	82. (
Total		173. 6

These contracts were initially awarded between 1961 and 1965 on the basis of price competition.

The claims are currently undergoing technical, legal, and factual analysis by the Navy and are scheduled for settlement in 1970.

The principal bases of the Lockheed claims are:

(a) Defective or late lead yard plans.

(b) Late Government furnished information (GFI), particularly in connection with the shock requirements of the DE 1052 Class contract.

(c) Late Government furnished equipment (GFE).

(d) Defective Government specifications.

- (e) Extra quality assurance requirements.
- (f) Constructive changes.
- (g) Unadjudicated formal change orders.
- (h) Interest.

Question. What has been the primary cause of the SCN (Ship Building and Conversion Navy) appropriation cost growth and what size cost growths might we still face?

Answer. A study was initiated on August 8, 1968, by the Chief of Naval Material as a result of evidence that the "Shipbuilding and Conversion, Navy" (SCN) appropriation would incur a deficiency if it were to continue with its plans to build and convert all the ships in its then currently authorized program. As a result of this situation, ships in the program had to be canceled and plans made to resolve the remaining deficiency.

The cost growth in the SCN appropriation had many causes. The study was able to identify several contributing items which by themselves would fully account for this deficiency. These are: (1) by fiscal year 1967, the Navy had optimistically reprogrammed \$253 million of its assets which, in retrospect, it still needed to complete its earlier programs; (2) from fiscal year 1966 through 1969, OSD and Congress imposed recoupment objectives totalling \$368 million (congressionaly imposed were \$15 million) against prior year program surpluses which, in retrospect, no longer existed; and (3) from fiscal year 1966 through 1968, the economic forecasts included in the Navy's SCN budget, failed to anticipate the subsequent inflationary trends by approximately \$205 million.

These three items totaling \$826 million, exceed the current deficiency. However, the study identified major weaknesses in the SCN management system which were obscured by SCN program surpluses of the early years, and whose existence contributed to the ineffectiveness of program control.

These weaknesses were:

1. Inadequate planning for the early, firm definition of ships.

- 2. Funding of developmental systems and experimental ships under SCN.
- 3. Reducing budget prices of ships below those developed by professional ship cost estimators (including recoupments).
- 4. Inadequacy of: specifications, control of change orders, and early anticipation of claims.
- 5. Lack of adequate management information and cost control systems for ship acquisition project managers (SHAPM).
- 6. Inadequate manpower priority of naval shippard new construction and conversion work.
 - 7. Failure always to balance program decisions with their cost impacts.
- 8. Shortage of manpower at NAVSHIPS Headquarters and other SCN management support activities.
- 9. Inability to forecast accurately for 2 to 5 years, economic conditions in the shipbuilding industry.
- 10. Reprogramming of apparent excess funds to offset new program requirements.

Additional cost growth

The total cost growth identified through the FY 1971 Budget as submitted to Congress amounts to \$812 million. A combination of Navy reprogramming actions and Budget Authority requests to the Congress, (including the \$210 million for claims and cost growth in the FY 1971 budget) would leave only \$100 million of \$812 million unfunded. Potential cost growth, beyond the \$812 million previously addressed, cannot be specifically identified at this time.

Question. Mr. Secretary, I am concerned to hear the figures you have given us on Navy personnel retention problem. Is the Navy requesting all it needs to alter this trend and if so, what size price package are we talking about?

Answer. Because of current fiscal constraints, I'm quite certain we did not. To substantially alter deteriorating retention trends, we will have to increase in coming years our investment in recruiting and make general improvements in the conditions of service life. Special emphasis in the future will have to be given to increased pay and housing allowances, more and better base housing, and increased in-service educational opportunities. An accurate price tag for this program simply cannot be determined.

Question. Secretary Chafee, the Army, Air Force and now the Navy have indicated that improvements to management of these weapon systems has included the institution of more adequate cost management controls. Can you tell us if the Navy is coordinating their efforts in this area with the OSD and the other services?

Has the Navy approved the cost and performance criteria for the F-14 contractor yet?

Answer. The Navy has approved the cost and performance management criteria for the F-14. The contract calls for management criteria to conform to DOD Instruction 7000.2. The management tool is called the Project Profile Manual. The Project Profile Manual provides summary data and information of the project's progress and status. It is structured in three volumes.

Volume 1 contains the Introduction, History, Aircraft Characteristics, Organ-

ization and Bibliography.

Volume 2 contains the Work Breakdown Structure (WBS), Master Schedules— Overall Performance, Problem Reports (Hotline and Action Reports), Performance to Schedule Status for significant work breakdown items, Financial Data, Technical Performance Status, and Contract Activities (ECP's, major letters of significance, etc.). With respect to progress reporting and status, Volume 2 is considered the "action" book.

Volume 3 contains reports and status for major Integrated Logistics Support areas in concert with and supporting the ILS summary report found in Volume 2.

The data contained in the reports directly associate with the WBS summary levels and the attendant reporting systems so that visibiliy of progress and/or satus is available in more detail, if required.

The names and phone numbers of Grumman contacts along with their respective NAVAIR counterparts—both for organization and WBS personnel—are shown in Volume 1, Section 1-6, and Volume 2, Section 2-3 respectively.

The Profile will be updated monthly. Revisions will be incorporated as required. Obsolete or outdated reports will, in each updating, be removed from their respective sections and listed in the Bibliography, Volume 1, Section 1-7. Nearly identical management tools will be required of the engine and weapons

control system contractors.

Coordination of cost control and other material matters are dealt with at the Joint Commanders meetings, attended by the senior Material/Logistics representatives of the Army, Navy and Air Force, which are held quarterly. An example of matters dealt with at these meetings are the Selected Acquisition Reports, the format of which was thoroughly discussed at these meetings.

Also, the concept of cost management, of course, runs throughout the Armed Services Procurement Regulation, which is meticulously coordinated among the

services and the Office of the Secretary of Defense (OSD).

As another example, Cost Schedule Control Systems Criteria, a program which requires contractors to meet certain criteria with respect to their cost and schedule planning and control, has been, and is still, the subject of extensive tri-service and OSD coordination to develop procedures for consistent application of these criteria.

In general, all significant management improvement actions initiated, or suggested, by the Navy are brought to the attention of OSD.

Question. You state that measures are being taken to ensure that major developmental problems have been resolved before initiating production.

Can you explain what measures these are and if they are being applied to current systems?

Answer. As an example, the following measures are being applied to currently planned ship procurements which involve developmental equipments:

-Higher level approval authority for the specifying of developmental equipments in ship characteristics, following thorough consideration of the cost and risk as well as the necessity for the concurrency decision. In the review, special attention is given to the financial and technical risks involved and the alternatives for accommodating these risks.

The incorporation in the designs and plans for these ships of a fallback position which will permit continuation of construction in the event a development item fails to meet its cost schedule or performance objectives. Continuous risk assessments are made by the ship acquisition project manager to insure that the decisions to use a developmental equipment or the fallback equipment is made in a timely, cost effective manner. Digitized by GOOGIG

Similar procedures are in effect in the other material areas of the Navy. In the procurement of aircraft, it is now customary procedure to assure that research and development aircraft perform according to specifications before monies are invested in production models. This is the procedure being followed with the S-3A aircraft.

Question. How does this tie into the S-3A program where you are asking for initial procurement funding and at the same time you estimate that about \$400 million more will be required for R&D in FY 1971 and subsequent?

Answer. We are asking for money to assure the delivery of long lead items for the first production aircraft which we hope to procure next year. This will not amount to a production release, since our contract with Lockheed specifically provides that no production lot has to be released until the R&D vehicle has been successfully flown and the avionics package has been successfully demonstrated in the laboratory. However, if the long lead money were delayed it would prohibit production next year even though tests were successful. This is considered a low risk program and we are confident that it will be ready on schedule.

We are also asking in FY 1971, to buy two aircraft to complete the test program with procurement funds since these two planes will later be reconfigured,

and will spend the majority of their service life in the Fleet.

Question. You stated that you believe the Navy had identified the primary cause of the SCN appropriation cost growth and that remedial actions will prove to be helpful?

Can you explain what this cause was and what remedial actions you have

takeni

You also state that older prorgams are likely to require additional financial inoreases.

Can you identify these programs and do they include the CVAN–68 and CVAN-697

Answer. The primary causes of the Shipbuilding and Conversion, Navy, appropriation cost growth were indicated in my response to your earlier question.

In order to remedy the primarly causes of the Shipbuilding and Conversion,

Navy appropriation cost growth, the Navy has developed a program for management system improvement to effectively control actions and decisions affecting SCN during the following periods:

1. The planning and pricing period. This identifies the time frame preceding the submission of the SCN budget to Congress.

2. The cost control period. This identifies the time frame after the budget has been submitted.

The study mentioned in my earlier response has submitted 83 recommendations. These when implemented should substantially improve the ability of the Navy to maintain fiscal control of the SCN program. In total, these recommendations fulfill the design objectives for management system improvements.

With regard to planning and pricing, the objectives are:

- 1. Ships to be built or converted should have all major decisions relating to their characteristics reached before final Navy budget estimates are made.
- 2. Characteristics to be either service evaluated or of low-risk concurrency with fallback provisions.
- 3. Estimates unconstrained by pressures to meet cost target budgets based on these estimates.
 - 4. Detailed documentation to support budget estimates.

With regard to cost control, the objectives are:

- 1. Configuration management instituted immediately upon submission of budget estimates with the same baseline as used for budget estimates.
- 2. Development and use of a ship acquisition plan (including financial plan) for each procurement in sufficient detail to insure that all major activities are appropriately scheduled, that interfaces and critical paths are known, and that cost targets are identified.
- A project management system which ensures that all decisions affecting a ship acquisition plan are coordinated by a single authority for approval and adjustment of the plan, with finances fully controlled by the project management organization.
 - 4. Improved contract plans and specifications.
- 5. An information system that reports progress against ship acquisition plans and continues to assess the probability that future events will take place according to plan.

- 6. Ability to make tradeoffs within the plans to compensate for difficulties encountered.
- 7. Adequate manning to ensure that management functions to be performed can be carried out.
- 8. Establishment of adequate reserves or recognized budgeting procedures to meet those contingencies which can neither be controlled nor compensated for.

The Study is currently being staffed within Navy to review the recommendations, determine actions to be taken on them and to develop an implementation

plan for the approved items.

The additional anticipated cost growth referred to in my previous response of as much as \$350 million covers all programs already under contract. As I indicated in other previous discussions, there is possible cost growth on CVAN 68 and 69. These two ships, as well as other ships have not been included in the \$350 million figure I have indicated. The most significant uncertainty in these ships is the level of wages and material costs that will be experienced during ship construction periods. The potential cost growth in excess of the \$812 million already mentioned, cannot be specifically identified at this time.

Question. Do you believe that the Navy's method of funding ship programs which I understand varies from other programs, has been a contributing factor in the projected cost growth?

Answer. The funding system is based on the experience that certain cost increases should be expected, but it is not considered that the funding system contributes to the cost growth.

Question. Do you believe that the escalation reserve used in the Navy ships program is an adequate protection against increased costs and if so, why isn't this same concept applied to other Navy programs that now are covering long periods of time?

Answer. The escalation reserve represents our best estimate of what costs in this category will be, but it does not provide insurance against any and all increases in the cost of labor and material. In shipbuilding the escalation concept is closely related to established contracting and program review procedures and cost indices associated with shipyard performance. The extension of this system to other high dollar, long term procurement areas is now under study and it is quite possible that escalation concept will be applied to other programs.

Question. I understand that a significant portion of the claim-against the Navy for ship construction are attributed to late delivery of government furnished equipment and information.

While I can understand, but not condone, the late delivery of the equipment if it did happen, I cannot understand why the government would be late in providing information to the contractor if this would reduce the claim problem.

Can you explain what the problem is in this area and what is being done

about it?

Answer. The timely delivery of government furnished equipment and information requires early definitization of equipment models and early placement of contracts with the suppliers of such equipment. When these are not successfully achieved and when the suppliers do not meet promised dates because of strikes or increased lead times for the obtaining of their materials, delays in government furnished equipment and information can and does occur. The following measures to deal with the controllable portions of this problem are being vigorously applied:

1. The early identification of the specific equipments to be government furnished and the incorporation of the specific model designations and planned

delivery dates in procurement solicitations.

2. The use of a specific order/response relation between the ship project manager and the secondary manager responsible for procurement of government furnished equipment and development or procurement of government furnished information.

3. A policy that timely procurement of government furnished equipment takes overriding consideration over the maximizing of purchase quantities if the latter prevents the meeting of required delivery dates.

4. The use of a highly specialized field activity to actively coordinate and expedite the development and furnishing of government furnished information to the shipbuilder.

5. Increased use of the computer in material ordering and progressing systems for the purpose of uncovering action delinquency and instituting corrective measures in a timely fashion. The system which has been used is being upgraded and made more responsive to the needs of the ship acquisition project managers.

Question. You state and the choice for weapon systems in the future will frequently be a few of several complex types or relatively more of a single, simpler type at a lesser cost.

Would you care to expand on this statement and provide the committee with

the benefits of your personal preference in this matter?

Answer. The statement refers to a problem of the present-day weapon system acquisition process. Namely, given a constrained procurement budget on the one hand, and rising unit costs on the other hand, we are finding it difficult to procure the sophisticated, high cost weapon systems in reasonably adequate numbers. Being forced to reduce quantities to numbers we can afford, we often find that reduced quantity procurement and reduced rates of procurement make for less efficient buys and, therefore, further inflated unit costs, One way out of this dilemma is through procurement of simpler, less costly systems.

I personally hold the view that was expressed quite well by Dr. Foster (DDR&E) in a recent address—we must seek the minimum necessary performance in our weapons and employ advanced technology to help reduce costs, else

we will be unable to afford what we need.

RETENTION OF NUCLEAR SUBMARINE OFFICERS

Chairman Stennis. Mr. Secretary, is there anything else now that you want to cover?

Secretary Chaffe. No, sir.

Chairman Stennis. Senator Schweiker, glad to have you here.

Senator Schweiker. Thank you, Mr. Chairman.

Mr. Secretary, do you have any later figures in your statement on the nuclear submarine retention officer problem? I mean maybe these

are the latest. How successful is the program that we have?

Secretary Chaffe. I talked to Admiral Shade who is in charge of the submarine force on the east coast, within the past couple weeks. He is encouraged by the progress, and, as a matter of fact, they not only have enough qualified officers to man our nuclear submarines, but more importantly, they have officers available for postgraduate school.

So, I would say that as of now it has been a success, not a wild success but nevertheless a success.

The Nuclear Submarine Officer retention figures in the statement, 75 percent in FY 1966 to 59 percent in FY 1969, with a further decline to 36 percent projected for FY 1970, are the latest figures available. It is not possible to project the FY 1971 retention rate at this time.

PROJECT MANAGERS

Senator Schweiker. Secretary Packard indicated in Secretary Laird's and his work on the control of cost overruns that one change they were either thinking of making, or were in the process of making, was to make the assignment as project managers of the weapons projects long-term assignments a career itself. What is the status of that project in the Navy at the present time? Are you familiar—

Secretary Chaffe. Yes; I certainly am.

I have devoted a lot of thought to this subject and I know Admiral Moorer has, too. We just met last Saturday with Secretary Packard and had considerable discussion on how we might offer some constructive suggestions in this area.

As yet, we do not have an absolute concrete solution to the problem, although we are keeping them in accordance—

Senator Schweiker. You are keeping them longer.

Secretary Chaffe. We are keeping them longer. Whether it should become a major command, for instance, for the man or just—the details are something we are working on.

Senator Schweiker. Are they considering, also, whether it should

be civilian experts as opposed to career service?

Secretary Chaffe. We have thought about that, too.

Senator Schweiker. I do not know; I am just raising the question. Secretary Chafee. It is a possibility.

Admiral MOORER. May I add two points?

I personally initiated two actions in this area. First, I have issued instructions to the selection boards that the fact an individual is held for an extended period of time because of the importance of his project manager assignment will be taken into account during his promotion consideration. And that notation will be made in his fitness report in the event this is required.

And secondly, we have very carefully reviewed the postgraduate school at Monterey in an effort to orient the courses towards preparation for being a program manager in Washington, vice being the business-school-type manager. In other words, to focus on the types of problems one meets with managing a defense weapons system.

Senator Schweiker. In terms of their curriculum, Admiral?

Admiral Moorer. Yes.

So we are moving in the direction of management stability. As you know, Mr. Packard has taken a personal interest in this. And I think we are making considerable progress, Senator.

FUTURE OF ULMS SYSTEM

Senator Schweiker. On the question of the underwater long-range missile system that Navy has been considering, I guess the Admiral would probably be the one to ask this.

How do you see in the long-range picture the relative cost, and I guess effectiveness—two factors—with the new ULMS system versus expanding or enlarging our POSEIDON/POLARIS system?

I know it is sort of a complicated question. Maybe you can put it

in layman's terms as to what our option is there.

Admiral Moorer. Of course, the POLARIS system, and to a lesser degree the POSEIDON system concept, are what we call sunk costs.

In other words, by [deleted] we will be completed with the conversion program and we will just begin at that time to construct the new replacement or the long-range missile system.

Now, what this new system will do for us with its very long range

is twofold.

One, it will permit us to have many more missiles at the ready, compared to the total number, than we have with the POLARIS/POSEIDON, simply because the submarine will always be within range of the targets because the missiles will have a very long range. So in that sense it is a more efficient system.

Secondly, being able to deploy them in many, many areas of the world that we cannot use today will pose a very difficult if not un-

manageable antisubmarine warfare problem for the Soviets. So we hope to stay ahead of ASW technology on the one hand and on the other get much more efficient use of the missile.

Senator Schweiker. How much is in this annual request for-

Admiral Moorer. This is just in the initial stage of the R. & D. and we have \$44 million in this current budget.

Senator Schweiker. You say it is only the initial phases.

Admiral Moorer. Yes, indeed, sir.

SOVIET SUBMARINE PARITY

Senator Schweiker. When do we figure that the Russians will pull ahead of us in the POLARIS nuclear sub field as far as numerically now?

Admiral Moorer. Apparently they have [deleted] of these Yankee-

class submarines in the water.

They are building them at the rate of one every 2 to 2½ months and, consequently, in 1974 they could equal us numerically with 41 submarines.

Senator Schweiker. How would you say their subs would compare to ours overall?

Admiral Moorer. This Yankee class is certainly not in any way up to the capability of the POSEIDON or even the POLARIS with the Λ -3 missile.

However, we know they are going ahead with the development of a new missile, possibly for this submarine [deleted] missile which

they have been testing.

Senator Schweiker. During what time frame do we have to make a decision on whether we are going to ULMS-or enlargement of the POLARIS/POSEIDON system if we are not going to get behind the Russians in this area?

In other words, what time frame is critical so that we won't lose our lead in terms of the-

Admiral Moorer. I think the mid-70's, Senator.

Senator Schweiker. You said 1974 was the time that they numerically could exceed us.

Admiral Moorer. Yes, sir.

I think the question as to whether we would replace a POSEIDON with the ULMS on a one-for-one basis or whether we would retain both at the same time would depend upon the strategic situation when the ULMS became operational. In other words, I do not think we have to make that decision today.

ULMS BUDGET REDUCTION

Senator Schweiker. Did our committee last year cut some money out of ULMS? I know we discussed it.

Admiral Moorer. Yes, sir; it was cut from \$20 million to \$10 million.

as I recall.

Senator Schweiker. From \$20 million down to \$10 million. I think one of the things the committee lacks-maybe you have conveyed this here in the record—is a sense of priority, assuming this is going to be the system that you are going to push in the future to keep parity or keep ahead or whatever you want to call it, with Russia. I am not

sure the committee has a sense of urgency from the discussions last year on this problem. Maybe they made that clear. I think one of the reasons they cut last year—I frankly was not in favor of the cut, I must say—was that maybe the committee did not quite have a sense of urgency that I feel we probably should have if this time frame of 1974 is anywhere near accurate.

Admiral Moorer. Well, I can only say that we are pressing ahead now as rapidly as we feel it is technically reasonable and feasible in the current fiscal climate, and we will certainly advance the develop-

ment and the construction as rapidly as possible.

Senator Schweiker. Do you see that there are major obstacles to going into this? In other words, does this take a lot of new basic work with new scientific applications to come up with this new system or is it more or less an extension of what we know now with just a lot of R. & D. necessary to work the thing out?

Admiral Moorer. Well, I think the basic technology is available. There is no question about the fact that when you scale up a device to this extent that you must be prepared for certain engineering problems. But there are no technical problems that we-

Senator Schweiker. That seem insurmountable at this point.

Admiral Moorer. Yes; that is right.

SUBMARINE SILENCING PROGRAM

Senator Schweiker. How about our submarine [deleted] program? When I was on the Anti-Submarine Committee in the House, we had a pretty good lead at that point on Russia in [deleted] the sub. Is this lead still retained?

It surprised me at that time that the Russians were not doing much

[deleted].

Are they now doing much or where do we stand comparatively

with Russia on [deleted] subs?

Admiral Moorer. I think we still do hold the lead and, of course, we are exerting every effort possible [deleted] not only the submarines in commission but particularly the new ones. This is one of the key aspects of the new construction. So far as the Soviets are concerned, they have [deleted] come out with new types of submarines. [Deleted.]

To answer your question in general terms, we are, I believe, superior

to them in this field.

On the other hand, we certainly cannot keep our eyes off the problem

because they are pressing ahead [deleted].

The [deleted] is apparent when viewed in conjunction with the increasing Soviet submarine threat. The threat increase is not just in total numbers, but more significantly they are becoming [deleted]. The next generation of Soviet SSNs is expected to appear in the [deleted]. They can also be expected to employ further application of [deleted].

The object of the program is to improve the [deleted] characteristics of our SSNs and SSBNs and thus maintain our qualitative superiority over the Soviets in this regard. Reductions in [deleted] will permit our submarines to remain on station and conduct operations with decreased probability of detection. Reductions [deleted] will permit more effective use of own ship sonar. Both of these factors directly affect the offensive capabilities of our SSNs and the vulnerability of SSBNs and SSNs when on station or in transit. The program goal is to [deleted] by the submarine to a level equal to or less than [deleted].

The major tasks of the submarine [deleted] program are to:

a. [Deleted.]

These and other innovations are also incorporated in the design of new construction submarines. For example, the PERMIT Class, as opposed to the earlier SKIPJACK Class, was constructed with [deleted] will provide the Navy with information that will be an important factor in choosing propulsion alternatives during the development of submarines of the future.

d. Provide training to shipboard and shippard personnel [deleted] analysis and maintenance/repair of [deleted] equipment. Shipyard personnel are further trained in the techniques [deleted] to develop a firm, highly competent, shipboard installation inspection capability so

that the [deleted] improvements achieved can be retained.

PARAFOIL DEVELOPMENT

Senator Schweiker. One more question, Mr. Chairman.

Some time back the Navy—I believe it was the Navy—got involved, Admiral, with testing what was called a parafoil system which theoretically, anyway, on paper looked like it would save a lot more pilots' lives if the scientists' theories and prognostications were right in terms of after a plane is shot down. I just wonder whether the experience that either you or the Marines had—I forget who it was—has borne out this sort of optimistic forecast of this inventor of this parafoil.

I know I was involved for a little while several years back.

Admiral Moorer. No, sir. As you recall, the idea was for the pilot to literally glide out over the water from the North Vietnam area. Senator Schweiker. After he got out of the plane?

Admiral Moorer. Yes, sir; but I do not think they were able to lick all the problems of deploying the foil from a supersonic aircraft and things like that.

I am aware of the program but— Senator Schweiker. Ejecting it.

Admiral Moorer. Yes. Ejecting it from a supersonic airplane which has a lot of acceleration and is pulling a lot of G's. Deploying this foil was not deemed to be feasible, but they are still looking at the idea.

Of course, the concept is very good.

Senator Schweiker. That is all, Mr. Chairman. Thank you.

Chairman STENNIS. Thank you, Senator.

Gentlemen, this F-14 aircraft now, you have covered the cost of them at the 457 production level and also at the 722 production level, have you not?

Admiral Moorer, Yes; and we are obligated to give a table on this for the record.

Chairman STENNIS. All right.

PREPARED QUESTIONS FROM SENATOR STENNIS

I have a few more questions here on the Harrier that I will put in the record for your usual responses within 1 week if you can get them back that early.

(Questions submitted by Senator Stennis. Answers supplied by the Department of the Navy.)

Question. Isn't it a fact, General, that even if [deleted] Harriers are built in the U.S. that the agreement with the English manufacturer calls for 50 percent of the production man hours to be subtracted with Hawker-Siddeley over the life of the contract?

Answer. Yes. A commercial agreement between McDonnell Douglas Corporation and Hawker Siddeley Aviation was executed 29 September 1969 and approved by the State Department on 27 October 1969. The agreement provides that Hawker Siddeley will furnish McDonnell Douglas all the technical data and know-how for the Harrier, aircraft, grants rights to manufacture and sell the aircraft in the United States and to use the information to design and sell new aircraft utilizing the Harrier principles. McDonnell Douglas has exclusive right (excepting Hawker Siddeley) to manufacture the aircraft, spares and associated ground equipment in the United States. For the first [deleted] aircraft sold to the United States, McDonnell Douglas must subcontract at least 50% of the production manhours to Hawker Siddeley.

Question. Isn't it a fact, General, that under the new arrangements to build [deleted] Harriers in the U.S. at a cost of [deleted] million that \$277.6 million of this amount will still be spent in England under the existing contractural arrangements?

Answer. The [deleted] Harrier procurement program under the licensing agreement is estimated to be \$566.2 million vice [deleted] million. The latter figure included the first 12 aircraft procured in FY-70. The expenditures in the U.K. for the [deleted] aircraft manufactured under license is estimated to be \$293.5 million. The figure of \$277.6 million was based on a gross percentage basis and is in error.

Question. Isn't it a fact, therefore, that for a maximum adverse balance of payments of \$107.7 million, the U.S. taxpayer will pay \$238.5 million for the Marine Corps to purchase the same [deleted] aircraft?

Answer. A valid computation of balance of payments based on a comparison of the original four year all United Kingdom Harrier procurement with the proposed United States transition program is not possible. The United States transition program includes an additional year of production. However, if the remaining [deleted] aircraft were procured over a four year period in the United Kingdom, program costs for the [deleted] aircraft are estimated to be \$456.3 million, which is \$110 million less than the four year transition program in the United States. Of the \$456.3 million it is estimated that \$434 million would represent expenditures in the United Kingdom. The four year transition to the United States program is estimated to incur \$293.5 million in United Kingdom expenditures or \$140 million less than an all United Kingdom program. Therefore, the additional cost incurred by a United States transition program is \$110 million for a reduction in United Kingdom expenditures of \$140 million, when comparing procurement of [deleted] aircraft over a four year period of time. Advantages to United States production transition include minimizing reliance on a foreign source for logistic support and bringing a successful V/STOL technology to the United States. Should the Air Force or Navy decide to procure Harrier the advantages would be more pronounced.

Question. General, how many Harrier squadrons has OSD approved for the Marine Corps as of today?

Answer. Secretary Laird has testified that besides the twelve aircraft in FY 1970 and eighteen in FY 1971, he has approved funds for long lead time items for [deleted] aircraft in FY 1972. There is, however, [deleted] squadron authorized to begin formation in FY 1971.

Question. General, the impression gained by the Armed Services Committee last year was that the Marine Corps would puchase 12 Harriers with FY 1970 funds and then after testing and evaluating them to determine their potential and value to the Marine Corps that a decision would be made on the wisdom of buying additional Harrier aircraft. Would this not be a far wiser course of action for the Marine Corps?

Answer. The Marine Corps believes that Harrier has been thoroughly tested and the resultant data fully supports the requested procurement of 18 Harriers in FY 1971. Marine evaluation of Harrier (12 FY-70 aircraft) prior to further procurement would delay delivery of the 13th aircraft by three years (to at least January 1975). The Harrier squadron, VMA-513, forms at MCAS Cherry Point in April 1971 after conclusion of Board of Inspection and Survey Trials. In July 1971 tactical evaluation of the aircraft could commence. A meaningful evaluation that would provide additional supporting rationale and data could not be completed prior to October 1971 when the FY 1973 budget will be finalized within OSD. Sufficient tactical evaluation could be completed by August 1972 to support FY 1974 procurement, however FY 1974 deliveries could not commence until January 1975, or later. To ensure aircraft deliveries early in CY 1975, it would be necessary to provide long lead funding to contractors prior to February 1973. Tactical evaluation results would support a reprogramming action in January 1973 for long lead funding for FY 1974.

The RAF will accept their last Harrier in [deleted] and the Hawker Siddeley production line will close at that time unless there is FY 1971 procurement. The front end of the line will commence to close down starting in [deleted] unless there is FY 1971 procurement. Naval Air Systems Command requested that Hawker Siddeley Aviation quote costs for start-up of a closed production line and Hawker Siddeley would not quote costs. Hawker Siddeley states that they have never reopened a closed production line. By in-house estimate Naval Air Systems Command estimates that if FY 1971 procurement is cancelled and 18 Harriers are authorized for procurement in FY 1972, the flyaway cost of 18 FY 1972 Harrier aircraft would be \$16.5 million higher than 18 FY 1971 Harriers. This increases the aircraft unit cost by \$0.910 million and assumes all aircraft

built in the United Kingdom without extra tooling being required.

It is not known what Hawker Siddeley Aviation would do with production tooling when the production line is closed. Further it is not known what Rolls Royce will do with PEGASUS engine tooling when their production line closes.

Question. General, isn't it a fact that the Harrier has only flown some [deleted] flying hours with the Royal Air Force as of January 1, 1970?

Is this an adequate test basis to commit the Marine Corps to the purchase of [deleted] aircraft?

Answer. Yes, the accumulated flying hours of the Harrier aircraft are ade-

quate to justify the Marine Corps program to purchase the aircraft.

The procurement of aircraft by fiscal year precludes committing a service to any total procurement amount of an aircraft until the final incerment has been authorized, funds have been provided and a contract placed. This does not mean that a plan for a total number of aircraft does not exist in the case of the AV-8 Harrier the Marine Corps is committed by virtue of FY 1970 procurement to a quantity of 12. The total plan of [deleted] Harrier aircraft proposed by the Marine Corps is based upon the aircraft being procured over a five year period. Procurement objectives are 18 in FY 1971, [deleted] in FY 1972, [deleted] in FY 1973, [deleted] in FY 1974, in addition to the 12 aircraft under contract with FY 1970 funds.

As of January 1, 1970 the Harrier and its predecessors, the P-1127 and Kestrel, had flown [deleted] sorties and [deleted] flight hours. Of this amount the Harrier had flown [deleted] flight hours and [deleted] sorties. First flight of the P-1127 took place on October 21, 1960. Two prototype and four development P-1127 aircraft were built. The Kestrel represented an improvement to the P-1127 although the aircraft were very similar in appearance. First flight of the Kestrel took place on March 7, 1964. Nine Kestrel FGA Mk.1 aircraft were built under a tripartite agreement between the United States, West Germany and British governments. The Kestrel Evaluation Squadron was composed of personnel from the United Kingdom, United States and West Germany. The squadron was in operation from February 1965 to November 1965 and proved the feasibility of a V/STOL attack aircraft as well as dispersed site operations. During May 1966 the Naval Air Test Center conducted a carrier suitability evaluation of the Kestrel while operating from the USS Independence and the USS Raleigh. The abstract of the report states: "A conceptual evaluation of jet V/STOL airplane operations aboard U.S. Navy ships was conducted. Twenty shorebased flights plus thirty-three flights aboard CVA and LPD ships were made with the Kestrel airplane. No basic problems were discovered during these

tests. The piloting techniques developed during shorebased operations were satisfactory for shipboard operations. Operation of jet V/STOL aircraft from CVA and LPD decks is feasible. The operational flexibility of the fleet would be enhanced greatly by the employment of jet V/STOL aircraft. Additional programs to exploit the potential of jet V/STOL airplanes aboard U.S. Navy ships are recommended." The report is dated October 17, 1966. Harrier is an improved airplane over the Kestrel with the improvements being a result of the extensive flight testing and evaluation of both the P-1127 and the Kestrel. First flight of the Harrier took place on August 31, 1966. The Royal Air Force formed the first operational Harrier squadron during April 1969 and the second RAF squadron commenced forming during January 1970. A RAF Squadron of Harriers will deploy to [deleted]. This operational deployment takes place [deleted] months before the first Harrier is received in the United States.

Two combat experienced Marine Corps pilots evaluated the Harrier during September and October 1968. Both were experienced test pilots and they stated

that the aircraft was fully operational.

A Navy Preliminary Evaluation of Harrier was conducted by three Naval Air Test Center Pilots during the time period 11-27 January 1969. The aircraft was equipped with the Pegasus 6 engine with [deleted] pounds thrust as compared to the Kestrel with 15,000 pounds thrust. Marine aircraft will be equipped with Pegasus 11 engine with [deleted] pounds thrust. The evaluation team concluded that the Harrier with a [deleted] pound thrust engine meets all of the performance requirements against which it was tested except for [deleted]. They further concluded that the Harrier airplane possesses excellent potential for accomplishment of the Marine Corps close support mission. The team stated that the capability of the airplane to operate from small, minimally prepared landing sites or assault ships will greatly enhance the Marine Corps quick reaction assault mission.

Beginning January 8, 1969 a combat experienced U.S. Navy pilot Commander R. J. Thomas evaluated the Harrier for a total of seven flights. The summary of his report stated:

1. The Harrier has been adequately tested to fit the terminology "off-the-shelf".

2. Its performance in present engine configuration exceeded expectations and it has the ability to be an operational asset at this time.

3. The present Harrier exceeds the A-4F in handling, capabilities and as a weapons delivery platform.

4. The Harrier possesses a secondary capability in the air-to-air regime that

very nearly equals the air-to-ground role.

5. Transition to the Harrier will require a very small degree of pilot training. During the time period 2-3 August 1969 shipboard trials were conducted aboard HMS Blake, a cruiser with a flight deck similar in size to a U.S. Navy LPD. The trials were successful in demonstrating that Harrier could operate from the small flight deck while the ship was underway.

In early March 1970 the RAF conducted follow-on sea trials aboard HMS *Eagle* and also they conducted a training deployment to Cyprus. The following message was received from the Marine Corps Liaison Officer at the Ministry of

Technology, London.

EAGLE TRIALS EMINENTLY SUCCESSFUL TO DATE. PREDICTED MAXIMUM GROSS WEIGHT HARRIER TAKEOFF PERFORMANCE FROM ANGLE DECK EAGLE (550 FEET) CONFIRMED. AT APPROXIMATELY EIGHT DEGREES CENTIGRADE, THIRTY KNOT WIND OVER DECK, HARRIER HAS TAKEN OFF AT [DELETED] POUNDS WITH WIDE MAR-GIN. TRIALS CONTINUE IN ORDER TO DETERMINE CROSS WIND LIM-ITS AND MAXIMUM WEIGHT AND MINIMUM WIND OVER DECK CON-NO AIRCRAFT HANDLING PROBLEMS APPARENT THOUGH STACK/ISLAND WASH ENCOUNTERED MANY OCCASIONS. INERTIAL NAVIGATION ATTACK SYSTEM ALIGNMENT ALSO OPTI-NORMAL TAKEOFF STOL. NORMAL LANDING ROLLING RAF DEPLOYMENT VTOL. FIRST TOCYPRUS HARRIER HIGHLY SUCCESSFUL. APPROXIMATELY [DELETED] FLIGHT HOURS ACCUMULATED BY TEN AIRCRAFT DURING ELEVEN WORKING PERIOD OF INTENSIVE WEAPONS TRAINING OPERATIONS. AIRCRAFT AVAILABILITY GENERALLY IN ORDER OF [DELETED] PER-CENT. THE [DELETED] MILE NON-REFUELED FERRY LEG WITH 100 GALLON TANKS ALSO CONFIRMED WITH COMBAT TIVE RESERVE FUEL.

At the time when the first Marine Corps Harrier from FY 1970 procurement is received, there will be nearly five years of flight test on the aircraft. In addition, the Royal Air Force will have had one operation squadron flying for two years and one additional squadron will have been flying for one year. Harrier is the result of ten years development effort at a cost of approximately \$400 million. Approximately \$50 million of development funding was provided by the United States under the Mutual Weapons Development Program.

Based upon test and evaluation flights by Marine Corps and U.S. Navy pilots in late 1968 and early 1969, the Marine Corps stated that Harrier was an operational aircraft which would fill an existing requirement. Procurement of 12 Harrier aircraft was requested in FY 1970. At that time the Marine Corps stated that the program objective would be [deleted] tactical squadrons with [deleted] aircraft each and [deleted] training squadron with [deleted] aircraft. During the additional year of flight testing and operational employment by the RAF, the Marine Corps Harrier Liaison Team in the UK has been working and flying with the RAF, and have been forwarding regular reports. The reports have detailed and documented the successful operational progress of the RAF and a high degree of aircraft reliability. The liaison team reports have addressed many specific details among which have been the excellent progress in the weapons clearance program, problems areas and subsequent solutions, the substantial and satisfactory progress made in the support area, verification of facility and site requirements, favorably assessed the on schedule engine development program, as well as the NAV/Attack System. They have reported the highly successful trials aboard HMS Blake and defined the USMC squadron organization table.

While these are only a few examples, the liaison teams efforts have reaffirmed that the Harrier has been thoroughly evaluated and is operationally ready. The liaison team reports have included a field experiment by the RAF. [Deleted]. The results clearly indicated the advantages [deleted] and strongly supports the USMC concepts.

The USAF evaluated Harrier in January 1969 and reported: "The aircraft was very easy to fly during vertical and partially jetborne flight, and appeared capable of being an effective ground attack fighter." A USAF exchange pilot flying with the RAF's first Harrier squadron has submitted quarterly reports, extracts of which follow:

15 November 1969

"It will now be noted that I will try to be as objective as possible about the aircraft, but having been very impressed with it personally, a few personal feelings will appear. A few very impressive capabilities have already come to the front even though we are still in the work-up phase of training before becoming operational. The aircraft have been extremely serviceable. By this I mean that if we have 3 good aircraft on the line to fly, we can fly [deleted] sorties a day (from 0830 till 1700) of [deleted] minutes each. The normal turnaround time (no weapons of course) is [deleted] minutes. This, of course, is a must for the role that is planned for the aircraft but it can actually be done too. The between flight servicing is very simple and fast and can be done by the pilot if necessary. All the pilots are given about 3 hours in the hangar to learn this."

"The V/STOL capabilities of the aircraft (as have already been shown in testing) are, of course, better than anything in existence today in the fighter business. All pilots in the squadron are already capable of taking off, landing and transitioning the aircraft on and off of a 50 by 50 foot pad, or using grass fields and clearings. I don't feel that we are by any means up to operational standards yet but there are definitely no problems that have confronted the pilots yet as far as handling the aircraft. It is now simply a matter of practicing the techniques until they are polished enough to be used anywhere."

"The vertical capabilities of the airplane are a tremendous advantage not for the take-off but for the recovery of aircraft when the airfield has been hit while they were on a mission. The airfields in use today are easily put out of commission for conventional aircraft by a few large craters in the runway. With the Harrier, however, one must crater the runway, parking ramps, taxiways, and approach road every 100–200 yards to stop a take-off with weapons. This, of course, poses a tough assignment even with the use of small nuclear weapons. The fuel, spares, and weapons for the Harrier could be stored near or even on the airfield (underground), and the aircraft then dispersed to sites only far enough away to be out of the "first strike" area of the immediate airfield and

then be brought in after their first retaliatory strike to make use of the strips of field left (vertical landing if necessary) and be refitted there and then take off on whatever strip of asphalt or grass is left fully loaded again. In the few hundred hours of flying that the squadron has done, I am completely convinced that the aircraft is, in fact, capable of doing this."

20 February 1970

"The aircraft has shown itself to be capable of operation in all modes of V/STOL flights with an average ground attack pilot at the controls. Even with the lack of a simulator or dual seat aircraft for instruction, the pilots have performed very well and have had to repeat only a very few exercises. No more than on the conventional aircraft courses that I have attended. Everyone is proficient in all phases of the V/STOL handling and have all worked from a 50 by 50 foot pad in a grass field. In the next month the squadron will go to [deleted] for a month of weapons firing to become qualified in rockets, dive and skip bombing and strafing."

"I am very impressed with the aircraft performance and handling at the lower level (below 20,000 ft) and most especially its energy maneuverability in this region. It seems to be at least as good as the F-4 and with the variable nozzles the turn radius can be considerably reduced. While the aircraft is not designed to be any type of air-superiority fighter, its capabilities at low level cannot be ignored. With variable nozzles and braking nozzles it introduces the ability to perform maneuvers that a conventional fighter is completely incapable of handling. The slow speed turning ability combined with an absolutely fierce deceleration can give it a quick advantage and with better than a 1 to 1 power to weight ratio available almost all the time, it has the acceleration to exploit that advantage."

"The next report will contain my feelings and observations on the weapons delivery system and the ability of the aircraft to deliver them. My general feeling at this time is that the V/STOL concept, in general, and especially in an environment such as Europe is the short/long range answer to flexibility and survivability. The Harrier is also, without doubt, the most capable fighter in the world today to handle the V/STOL concept and make it work. I think that there is a definite place for the aircraft in any air force concerned with survivability. The second V/STOL fighter will undoubtedly be better but (unless it is very secret) it is many years away. I hope that the USAF (I am reasonably sure they are) should take a very close look at this aircraft."

The Marine Corps has reaffirmed that Harrier is a fully operational aircraft and has requested procurement of 18 aircraft in FY 1971.

[Deleted] F-4 aircraft will be traded for each Harrier [deleted] obtained. To maintain combat capability the Marine Corps must replace the attack capability of the [deleted] plane F-4 squadron that is given up. Receipt of 12 Harriers from FY 1970 procurement does not provide for pipeline or attrition for more than a [deleted] plane Harrier squadron. The Marine Corps, Navy and OSD position is that the Harrier is a light attack aircraft with an ordnance carrying capability similar to the A-4 aircraft. The required unit equipment (UE) is [deleted] aircraft per squadron in the same manner that a Marine A-4 squadron is equipped with [deleted] aircraft. The Marine Corps cannot replace the attack capability of [deleted] F-4 aircraft with 12 Harriers since it is agreed within OSD that [deleted] operating Harriers are required for this purpose. The request for 18 aircraft in FY 1971 completes the first squadron UE of [deleted] aircraft, while providing continuity in combat capability. In addition, the request provides for pipeline aircraft, attrition and [deleted] aircraft for the initial formation of a training squadron.

Question. What is the RAF's accident experience on this aircraft?

Answer. There have been a total of [deleted] Harrier accidents of which by U.S. Navy criteria, [deleted] would be termed accidents and [deleted] would be termed an incident. Considering the RAF alone they have experienced [deleted] accidents and [deleted]. None of these were fatal and in each case the aircraft was repairable. One pilot was responsible for [deleted] accidents and he is no longer flying the Harrier. One of the [deleted] RAF accidents was due to [deleted] during take-off and the cause of this [deleted] has been corrected by Rolls Royce. Of the [deleted] non-RAF accidents, one occurred with a U.S. Air Force pilot flying the aircraft and he was fatally injured. This is the only fatality that has occurred in nearly ten years of flying P-1127, Kestrel and Harrier aircraft.

The [deleted] non-RAF accident occurred with a Hawker Siddeley test pilot at the controls. The [deleted] and the pilot successfully ejected at about 100 feet altitude. The problem with the [deleted] has been corrected. Of the [deleted] non-RAF accidents that occurred, [deleted] aircraft were destroyed.

Lower take-off and landing speeds of V/STOL aircraft are expected to reduce aircraft accident rates as has been the case with helicopters. For instance during 1966 and 1967 approximately one-third of all noncombat aircraft accidents in the U.S. Navy and USAF occurred during the landing phase. In the category of landing accidents the accident rate for conventional landings is generally about three times as high as for vertical landings. A tactical V/STOL aircraft's normal landing mode is vertical. Take-off accidents, like landing accidents, appear to be directly related to ground velocities and as such, should be reduced by short (lower speed) take-off operations.

In summary the Marine Corps believes that Harrier has a good safety record. Not one aircraft has been destroyed in operational use and in ten years of develop-

ment flying there has been only one fatality.

Question. What do you think its capability would be in supporting Marine Corps troops in the close air support role!

Answer. Harrier is the only operational V/STOL aircraft in the Free World and while it compares to the A-4 in ordnance carrying capability and sortie rate, it is capable of taking off in 300 to 600 feet with [deleted] pounds of ordnance and effectively striking ground targets within the amphibious objective area. When required, the Harrier can take off vertically and after completing a combat mission it can always land vertically. During amphibious operations Harrier can be phased ashore much more rapidly than conventional jet aircraft which require either long runways or a shore based catapult for takeoff. In addition, the Harrier operating base will be much less vulnerable to air attack. In essence the

aircraft can operate from any site that a helicopter can operate from.

With the V/STOL capability of the AV-8, Marine pilots can reduce response time to close air support requests by as much as 75%. Harrier will be located much closer to probable target areas than a conventional jet aircraft since it will be operating from beaches, roads, athletic fields, grass fields or clearings in the trees. Harrier will loiter on the ground with engine off rather than in the air as a conventional jet aircraft does. Because of Harrier basing flexibility, shore based flight operations with this attack aircraft will not have to wait for airfields to be built or captured. Also there will be no reliance upon the whims of

foreign governments for base rights.

Since the Marine Corps provides the landing force element of the amphibious task force, it is equally concerned about shipboard compatability of its aircraft. The Harrier permits the Marine Corps to operate a jet attack aircraft from the decks of the LHA, LPH, LPD and LST in addition to the CVA and CVS. Typical Harrier shipboard capability with the Pegasus 11 engine ([deleted] pounds thrust) is as follows:

SHIPBOARD PERFORMANCE (30° C.)

Wind over deck (knots)	Ordnance pounds	Deck run	Mission radius	Loiter time	Combat time
0 15	:]				
25 25 35	[Deleted]				
35	.]				

Because Harrier can be based so close to ground units requiring close air support, it provides flexibility and responsiveness in the close air support environment and that cannot be approached by conventional jet attack aircraft. Harrier will not depend upon long, expensive, and vulnerable runways. It is not a long range interdiction aircraft. It is a light attack aircraft with a V/STOL capability that sets it apart from all other fighter and attack aircraft in the Free World. The AV-8 Harrier is completely unique in its capability to provide close air support for ground forces.

CARRIER PROGRAM

Chairman Stennis. Back to this carrier a minute, and what I said about the executive branch giving us a yes-or-no request, I favor the

carrier on the facts that I know now.

Before it goes into the bill and certainly before it goes before the Senate floor, the executive branch will just have to say yes, we want it or no, we do not want it, you see. We cannot travel on anything less than that.

You can convey that to them, but I think I will write them a letter,

too, that that is our opinion about this matter.

Mr. Secretary, anything you wish to say additionally now?

Secretary Chaffe. No, sir; not at this time.

Chairman STENNIS. Admiral?

Admiral Moorer. I would like to say one thing, Mr. Chairman. With the tempo of the operations which we are experiencing today, I feel that this budget is actually a rockbottom budget and that any reduction in the budget in terms of such things as OPN, O. & M., MPN—that is, maintenance money, procurement money, and personnel money—would again force us to inactivate more ships and to reduce our operations overseas.

I think that this budget is just as tight as we can make it.

Chairman Stennis. All right. Well, I am sure all of you have worked hard on it and have a lot of good items in here. I know what you have to say about the O. & M. funds and personnel. Of course, those items are not in this bill as you know. This is hardware. But the problem all goes along together. That is what you were talking about.

General Chapman, do you have anything else? General Charman. No, sir; I have nothing to add. Chairman Stennis. Well, gentlemen—

Senator Schweiker. I have just one more question.

Chairman STENNIS. Yes.

SOVIET MISSILE TRACKING ABILITY

Senator Schweiker. Do the Russians have any ability under the present state of the art? Suppose they were to set out to track our present POLARIS fleet, and at some given point in time decided to incapacitate it. Do they have any technology or is there any present state of the art that they would be able to do this presently?

In other words, do they have any capability to do something like

this presently?

Admiral Moorer. No, sir. In my view they do not. Certainly they have not demonstrated it so far.

Senator Schweiker. Even in terms of tracking or being able to incapacitate-

Admiral Moorer. That is correct; in my view. [Deleted.] I do not

think they have the capability today.

Senator Schweiker. So it would be your judgment that as of now the POLARIS fleet would be fairly immune from anyone's attack?

Admiral Moorer. Yes, sir. That is up to this date; yes, sir. Senator Schweiker. Thank you very much.

Chairman STENNIS. Thank you.

All right, gentlemen. I thank you and thank all those that came with you in support of you and I think we have had a mighty good

day here.

I want to say with emphasis that you gentlemen have got to work out some way to be better understood about these so-called cost estimates which create the cost overruns going into billions of dollars before there is a contract made. That shows how ridiculous the terminology is. It is totally a misnomer but it is a fact of life, too, and I think you can cope with it by getting your terms straightened out. I know it takes some hard work in public relations to do it but the Navy is not a beginner in public relations either.

So work out something on that. All right. Thank you very much.

I will place in the record a letter and charts received from Admiral Moorer.

(The information follows:)

CHIEF OF NAVAL OPERATIONS, March 13, 1970.

Hon. John Stennis, Chairman, Committee on Armed Services,

U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: I am enclosing herewith two summaries which I believe may be of interest to you and the other members of the Committee on Armed Services in your consideration of the Fiscal Year 1971 Navy authorization request and, specifically the problem of modernization of active fleet ships of the

Navy.

The first summary of the Shipbuilding and Conversion, Navy Appropriation depicts the relationships between the amounts appropriated for this account and the total Navy appropriations for Fiscal Years 1962 through 1970. The graph portrays quite vividly the crux of the fleet modernization problem; even with generally increasing total Navy appropriations, the amounts available for replacement of our aging fleet ships have not changed appreciably, particularly since Fiscal Year 1965. The impact of the high-priority POLARIS and POSEIDON programs on the amounts available for modernization of the rest of the fleet is also depicted.

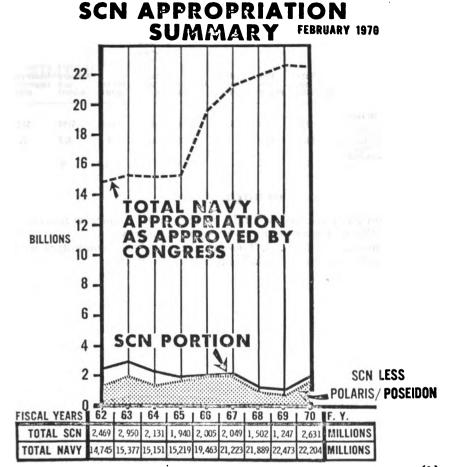
The second summary shows the average allocation of these funds to the various types of ships in the active fleet during this same period. From this, at least a general sense of the Navy's modernization emphasis within available funding becomes evident as does the priority which necessarily has been accorded the

POLARIS and POSEIDON programs.

I trust this information proves helpful to you. I would, of course, be pleased to enlarge upon it in any manner that you might wish.

Sincerely,

T. H. MOORER, Admiral, U.S. Navy.



Enclosure (1)

1372

ALLOCATION OF SCN FUNDING TO ACTIVE FLEET SHIP TYPES FISCAL YEARS 1962-70 [Dollars in millions]

	Sub- marines (SS/SSN)	FBM sub- marines	Surface com- batants	Amphib- ious	Mine counter- measures and patrol (includ- ing DE)	Aircraft carriers	Auxiliary and support	Underway replenish men ^t
Yearly average fiscal years 1962-70	. \$367	\$ 316	\$ 316	\$236	\$217	\$184	\$160	\$138
Percentage of total SCN fiscal years 1962–70 Percentage of total Navy	19.0	16.3	16. 3	12. 2	11.2	9. 6	8.3	7.1
budget fiscal years 1962– 70	2. 0	1.7	1.7	1.3	1. 2	1.0	.9	.8

COMMITTEE RECESS

Chairman Stennis. We will take a recess until tomorrow morning

at 10 a.m. We will hear your procurement tomorrow.

(Whereupon, at 4:50 p.m., Tuesday, March 17, the committee was recessed to reconvene at 10 a.m., Wednesday, March 18.)

MILITARY PROCUREMENT FOR FISCAL YEAR 1971

WEDNESDAY, MARCH 18, 1970

U.S. SENATE, COMMITTEE ON ARMED SERVICES, Washington, D.C.

The Committee on Armed Services met at 10 a.m., in room 212, Old Senate Office Building, Hon. John Stennis (chairman) presiding. Present: Senators Stennis (Chairman), Smith of Maine, and

Goldwater.

Of the staff of the Committee on Armed Services: T. Edward Braswell, Jr., chief of staff; and Labre R. Garcia, professional staff member.

Of the staff of the Preparedness Investigating Subcommittee: James T. Kendall, chief counsel; Ben Gilleas, director of investigations; Ed Kenney, Don L. Lynch, David A. Littleton, and George Foster, professional staff members.

DEPARTMENT OF THE NAVY

PROCUREMENT

BUDGET REQUEST

Chairman Stennis. The committee continues today with the Navy on the annual authorization bill. This morning we will receive the line item testimony on aircraft, missiles, and combat tracked vehicles and, if time permits, a brief discussion on the "other weapons" whose authorization is required as a result of language added to the procurement bill last fall. This afternoon the committee will receive the Navy presentation on shipbuilding and conversion.

The principal witnesses are as follows:

Aircraft and missiles: Vice Adm. T. F. Connolly, Deputy Chief

of Naval Operations (Air).

Tracked vehicles: Maj. Gen. G. C. Axtell, Assistant Chief of Staff for Logistics, Headquarters U.S. Marine Corps.

Other weapons: Vice Adm. R. L. Shifley, Deputy Chief of Naval

Operations (Logistics).

Shipbuilding and conversion: Vice Adm. R. W. Cousins, Deputy

Chief of Naval Operations, Fleet Operations and Readiness.

For the record the Chair will repeat what was said at the opening meeting with the Navy with respect to the amounts in this bill for the Navy: Out of a total new obligational authority Defense budget request of \$71.2 billion for fiscal year 1971, the budget request for the Department of the Navy is \$21.7 billion. Of the fiscal year 1971 procurement authorization request totaling \$20.2 billion, the Navy portion totals \$8.2 billion with \$6.1 billion in the form of procurement and \$2.2 billion in the form of R.D.T. & E.

The breakdown of the \$6.1 billion for procurement is as follows:

Aircraft	\$2. 4 1. 0	billion billion
Naval vessels		
Tracked vehicles		
Other weapons	7. 2	million

Admiral Connolly, we will be glad to hear from you at this time.

STATEMENT OF VICE ADM. T. F. CONNOLLY. DEPUTY CHIEF OF NAVAL OPERATIONS (AIR); ACCOMPANIED BY MAJ. GEN. G. C. AXTELL, U.S. MARINE CORPS. ASSISTANT CHIEF OF STAFF FOR LOGISTICS, HEADQUARTERS, U.S. MARINE CORPS; VICE ADM. R. L. SHIFLEY, DEPUTY CHIEF OF NAVAL OPERATIONS (LOGIS-TICS); AND VICE ADM, R. W. COUSINS, DEPUTY CHIEF OF NAVAL OPERATIONS, FLEET OPERATIONS AND READINESS

Admiral Connolly, Mr. Chairman, in accordance with instructions of the Secretary of Defense the program presented fits the strategy of one and a half wars.

' Chairman STENNIS. Will you please supply a statement on that! Admiral Connolly. Yes, Mr. Chairman. (The information follows:)

I would like to state at the outset that the aircraft and missiles that we are asking your authorization to buy this year are necessary to give us the proper equipment to fight the one and a half war strategy. Our request is certainly consistent with this published shift in national strategy. As you know, we have made some reductions in forces over the past year and I will say candidly that we simply do not have the forces for a two and a half war strategy.

I would also like to point out that we are presenting to you today a family of aircraft and weapons that will be with us for several years to come. We have made heavy research and development investments in these systems and they are now at the point where they are ready for production to flesh-out our forces with the kind of equipment that is appropriate to counter the weapon systems our potential enemies possess. I do not believe that we will be coming to you for production of a new aircraft or weapons that is not in this presentation before you today probably for the next [deleted] years. We will, of course, continue to seek improvements in the capability and reliability of these new systems, but we have a good array of aircraft and missiles, fortified by strong research and development effort, which are now ready for production.

I must point out that you will note small procurement quantities in both the missile and the aircraft procurement requests. Speaking first to the missiles, mindful of their cost, we are taking a calculated risk in buying small quantities. Quite obviously, if we got into a major war these production quantities would have to be increased markedly. [Deleted.] However, it does not seem sensible to build up a large inventory of missiles when, recognizing the financial constraints, such an inventory build-up would greatly hamper our ability to procure the proper aircraft to deliver these weapons. So we must seek a balance in the expenditure of our present procurement money and this balance does entail some risk. However, we do have production lines going at a minimum rate for these missiles, and if the need arises, production could be stepped up greatly.

With respect to aircraft you will note that we also are buying small quantities, particularly in the combat aircraft. This is necessary because our request contains several new aircraft such as the F-14, the S-3A, the EA-6B and the AV-6B with the capabilities urgently required. These aircraft are at the very beginning of their service periods and, consequently, at their most costly in terms of unit

price. We are certain that we should not slip the capability by postponing procurement of any of these models. Hence, [deleted] our quantitative aircraft procurement will be very low until we move further into production of a given type and associated lower unit costs.

The Soviets are and have been hard at work on the development of weapon systems of this nature. Viewing this threat, our own capabilities, and the funds which are available, we have arrived at a carefully conceived balance in our

request for these programs.

Admiral Connolly. I welcome again the opportunity to present to you the Navy's aircraft and missile procurement request.

In fiscal year 1971 we are requesting 261 aircraft—150 combat and

111 trainers.

Modern weapons systems are needed to stay up with continuing Soviet advances. As an example, the Soviet Foxbat fighter shown here was first publicly demonstrated in 1967. The Yankee class nuclear submarine, similar to our POLARIS FBM boats, has [deleted]. Our objective is to build a modern Navy, perhaps smaller in numbers, but stronger in quality and capability. We believe that we must be able to at least match the best the Soviets have to offer, particularly missiles. The next two slides are examples of their progress in this area.

The Russian cruiser shown here is carrying the SHADDOCK surface-to-surface guided missile. It has a much longer range than their STYX missile with which you may be familiar. This slide shows a supersonic Blinder bomber carrying the air-to-surface KITCHEN

missile [deleted].

Mr. Chairman, with your permission I will review each aircraft re-

quested this year.

I will show a picture of the aircraft and corresponding data sheets. The data sheets will be provided the reporter for the record.

(The information follows:)

Service .- Navy.

P-1 line item.-1, 2 Nomenclature.—A-4M Attack Aircraft. Popular name.—Skyhawk.

Mission.—A hight performance, visual, jet attack aircraft which provides a carrier/land based mobile striking force capable of delivering repeated and versatile air attacks on sea or shore under visual weather conditions in support

of seaborne or ground operations.

Description.—The A-4M is a Marine Corps aircraft with design improvements specific to their needs for specialized close air support. It is similar to the predecessor A-4F, capable of dive, glide and loft bombing attacks with conventional, missile, or nuclear air-to-ground weapons. It is capable of air refueling as a tanker or receiver. It differs from the A-4F in the inclusion of an uprated engine J52-P-408), a self-contained starter, drag chute, enlarged canopy, improved gun sight and increased ammo capacity.

(See cost data table on page 1383.)

Basis for fiscal year 1971 request.—These 24 aircraft form the second increment of A-4M procurement to continue modernization of the USMC light attack aircraft inventory. Some of the older series of A-4's are being retired or assigned to other roles due to age. Later versions will be utilized to the maximum extent possible within available service life to provide for economic phasing of the A-4M into this important close air support role. The FY-71 procurement will provide for the [deleted] planned USMC A-4F/M squadrons.

Service.—Navy.

P-1 Une stcm.-5, 8.

Nomenclature.—A-6E Attack Aircraft.

Popular name.—Intruder.

Mission.—Destruction, in all-weather conditions and during darkness, of both fixed and moving sea or land targets especially at low level, and direct support of ground operations. Digitized by Google

Description.—The A-6 is a long range, versatile, twin jet, carrier and land based attack aircraft capable of very accurate navigation, and delivery of nuclear and non-nuclear weapons from its 5 external stores stations. It has a moving target indicating system and uses two J-52-P-6/8A/408 engines. It can provide pathfinder/strike leader function for visual attack planes when required. The "E model" incorporates a new microminaturized digital computer, a solid state weapons release system and a single integrated track and search radar.

(See cost data table on page 1384.)

Basis for fiscal year 1971 request.—The 12 A-6E aircraft requested this year will be used to replace older A-8A airframes which are being modified to a tanker configuration. We except this effective medium-attack jet to remain the bulwark of the Navy's all-weather attack capability through the mid-1980's. Accordingly, we have improved the reliability and performance capability in the "E" series with the incorporation of advanced avionics. We expect to be operating [deleted] squadrons of Intruder's by FY 1979 [deleted] in the Navy and [deleted] in the Marine Corps.

Service.—Navy.

P-1 line item.—7, 8.

Nomenclature.—EA-6B Electronic Warfare Aircraft. Popular name.—Intruder.

Mission.—To detect, locate, classify and jam enemy electronic emitters over a wide spectrum and thereby reduce enemy's time available to react to strike aircraft.

Description.—The EA-6B is a carrier-based, twin jet, electronic warfare version of the A-6, and is completely compatible with strike aircraft in speed, range and maneuverability. The aircraft has modern sensors, computer and jammers which provide automatic multiple responses and a significant improvement in capability. Its high-powered [deleted] jammers provide high order of magnitude increase in effectiveness over the EKA-3B which it will replace.

(See cost data table on page 1385.)

Basis for fiscal year 1971 requists.—The eight EA-6B's in FY-71 provide the second production increment of procurement to update this important facet of our combat capability. The EA-6B is the first aircraft specifically built for the tactical jamming mission and will provide our carrier air wings with a modern electronic warfare capability. Accompanying the carrier strike force, it will enhance mission success and reduce the attrition of strike aircraft and pilots. Based on successful completion in December 1969 of testing which confirmed the operational effectiveness of the EA-6B, we are proceeding with production to provide for detachments of this aircraft in our carrier air wings and eventually for [deleted] Marine squadrons.

Service.-Navy.

P-1 line item.—12, 13.

Nomenclature.—A-7E attack aircraft.

Popular name.—Corsair II.

Mission.—A land/carrier-based, subsonic, medium range, visual, light attack aircraft carrying tactical nuclear weapons and practically all types of conventional ordnance in the Navy's inventory while performing close tactical air

support, interdiction, or air superiority missions.

Description.—Single piloted, single engine light attack jet with six external wing stations, two external fuselage stations and nose gear catapulting. Features an improved weapons delivery/navigation system including a "head up" display, central digital computer, an inertial platform, projected map display and other improved avionics, one internal M61 20mm gun, and improved cockpit configuration, anti-skid brakes, and will use the TF41-A-2 engine. The A-7E provides a substantial increase in radius and load carrying capability over the A-4 which it replaces.

(See cost data table on page 1386.)

Basis for fiscal year 1971 request.—The Navy's A-7E force equipage was essentially completed with the FY-69 buy. Procurement in FY-70/71 and subsequent buys are required to sustain the approved A-7 force of [deleted] squad-

¹ The first 67 A-7E's utilized the TF-80-P-8 engine.

rons. Besides the added payload and bombing accuracy of this versatile light attack aircraft, the 15,000 pound thrust of the new TF-41 engine provides considerably more combat maneuverability in a heavily defended environment. The A-7's combat effectiveness has been proved in Southeast Asia.

Service.-Navy.

P-1 line item.-10, 11.

Nomenclature.—AV-6B Attack Aircraft. Popular name.—Harrier.

Mission/Description.—To exploit the vast potential of Vertical/Short Take Off and Landing (V/STOL) attack aircraft capability in Marine air-ground concepts, including greatly increased dispersal, more rapid response to air support requirements of ground forces and significantly increased tactical flexibility. The AV-6B Harrier is a single piloted, single fan jet transonic V/STOL aircraft, distinguished by a shoulder mounted swept wing and a swept tailplane, a single vertical fin and rudder, and four rotatable engine thrust nozzles located two on each side of the fuselage. The Harrier is powered by a Rolls Royce Pegasus Mark 103 vectored thrust engine of [deleted] lb. thrust.

(See cost data table on page 1387.)

Basis for fiscal year 1971 request.—The 18 AV-6B aircraft in the FY 1971 procurement, along with the 12 from last year, are required to complete outsitting of the [deleted] AV-6B squadron and provide for initial training needs. A completely equipped AV-6B squadron is required to maintain USMC tactical aircraft force levels as [deleted] squadrons are phased out. Present plans call for completion of [deleted] in [deleted] and completion of AV-6B procurement in [deleted].

Service.—Navy.

P-1 Line item.—17, 18. Nomenclature.—F-14A Fighter Aircraft.

Popular name.—None.

Mission.—High performance air superiority fighter with secondary air-to-air combat role of fleet air defense. Inherent capabilities provide effective subsidiary role in air-to-surface attack mission.

Description.—The F-14A is a two-place, tandem seat, variable sweep wing, supersonic, carrier-based airborne weapon system designed to replace the F-4 in Naval fighter and fleet air defense roles in the 1973-1980 time period. It will have visual attack and all-weather capability to deliver PHOENIX and SPAR-BOW missiles using a modified AN/AWG-9 weapon control system. It will also employ an M-61 gun and SIDEWINDER missiles for additional close-in air-toair combat capability. Titanium is being used to minimize weight. Development was premised on maximum use of previously developed Avionics hardware to limit risk and cost. The F-14A is powered by twin TF30-P412 engines (modified TF30-P12 developed for other aircraft programs).

(See cost data table on page 1388.)

Basis for fiscal year 1971 request.—26 F-14A aircraft (called Lot 111) are required to continue an orderly, least cost and earliest Initial Operating Capability (IOC) for the introduction of this new Navy fighter. The first eight of the Lot III aircraft will supplement 12 R&D aircraft (Lots I & II) to enable the Navy to complete technical evaluation, conduct Board of Inspection and Survey trials and provide aircraft for fleet test and evaluation. The remaining 18 aircraft in Lot III will provide the Fleet training squadron (CRAW) aircraft to commence training for initial IOC in April 1973. Long range plans include building to [deleted] Navy and [deleted] Marine squadrons by FY-80.

Adherence to the planned program will permit attainment of force levels at the earliest possible time frame consistent with the most cost-effective profile within the limits of the existing contract. Failure to approve this program by stretching this schedule will result in higher program unit costs due to learning curve and economic effects. Also, if the F-14 program is stretched, some additional F-4J

aircraft will have to be procured to maintain force levels.

Service .- Navy. P–1 line item.—23, 24. Nomenclature.—ÜH-1N Utility Helicopter. Popular name.—Iroquois.

Mission.—The basic mission includes all weather transport of troops, equipment, and cargo in amphibious assault and subsequent operations ashore. Also provide for combat support, command and control requirements of surface combatant, auxiliary forces, riverine warfare forces, and construction battalions.

Description.—A land/sea based multi-turbine engine (T400-CP-400) version of the UH-1 model helicopter, which provides single engine operational capability in the event of one engine failure and improved performance with growth poten-

tial.

(See cost data table on page 1389.)

Basis for fiscal year 1971 request.—The UH-1N's requested will serve as attrition replacements for approved Marine Corps UH-IE force levels. The ultimate UH-1 forces in FY-79 will include [deleted] Marine UH-1N squadrons and [deleted] Navy UH-1N squadrons as well as additional training, development and reserve aircraft.

A phased procurement will result in attainment of the service inventory objective with the FY77 buy.

Service.-Navy.

P-1 line item.—25, 26.

Nomenclature.—P-3C Patrol Aircraft.

Popular name.—Orion.

Mission.—Primary mission is anti-submarine warfare (ASW); to detect, classify, track, localize and destroy conventional and high performance submarines (of the 1968-80 period); conduct long range barrier patrols, convoy escort, hold down, hunt-killer operations and area search in all weather conditions; and to act as in-flight area coordinator at a scene of action. Secondary missions are aerial mining, maritime surveillance, coastal shipping destruction and intelligence collection.

Description.—The P-3C aircraft is a land based, four engine, high speed turbo-prop ASW patrol aircraft. ASW systems include acoustic data processing of directional LOFAR (DIFAR), radar, low light level TV, electronic countermeasures (ECM) and magnetic anomaly detection equipment, Tactical system includes integrated display and inertial doppler navigator. The P-3C includes A-NEW capabilities. It has the data handling capacity, flexibility and accuracy of an airborne digital data processing system thoroughly integrated with appropriate sensor, display, navigation, communication and armament equipments. The A-NEW system provides at least [deleted] times the tactical effectiveness of the P-3A/B. The P-3C differs from its predecessor P-3A by inclusion of the A-NEW capabilities, improved sensors, communications, and the use of four T-56-A-14 engines vice four T-56-A-10 engines. The P-3C differs from its predecessor P-3B by inclusion of A-NEW avionics, improved sensors, DIFAR and digital command and control communication system.

(See cost data table on page 1390.)

Basis for fiscal year 1971 request.—The P-3C A-NEW avionics capability is required in order to stay abreast of the rapidly increasing Soviet submarine threat which includes [deleted] new types within the last 18 months, including the YANKEE class FBM (similar to POLARIS). The 12 P-3C aircraft being procured permit continued modernization of VP forces at a rate of about [deleted] FY 71 procurement will provide for the [deleted] P-3C squadron in an approved force of [deleted] VP squadrons. When inventory objective is obtained in FY 1980, the force will consist of [deleted] P-3C squadrons and [deleted] P-3B squadrons.

Service.-Navy.

P-1 line item.—27, 28.

Nomenclature.—S-3A antisubmarine aircraft.

Popular Name.-None.

Mission.—Carrier-based, antisubmarine warfare (ASW) aircraft designed for contact investigation, persistent search and attack, ASW protection of high priority operations at sea, and for surface surveillance and attack.

Description.—The S-3A will be a high subsonic, all-weather, long range/endurance jet aircraft powered by two G.E. TF-34 high-by-pass turbofan engines, and will be capable of locating and destroying the projected submarine threat

of 1975 and beyond. It will be a totally integrated and highly automated weapons system controlled by a general purpose digital computer. It will have the capability of maneuvering at high and low altitudes with endurance in excess of [deleted] hours. The S-3A will replace the S-2 "Tracker" series.

The avionics system includes acoustic data processing of [deleted] LOFAR, command active sonobusy (CASS), and [deleted] CASS (DICASS) information, high resolution ASW radar, forward looking infrared (FLIR), improved magnetic anomaly detector (MAD), and passive EOM. The doppler/intertial system will provide accurate long range and tactical navigation capability. The wearons everem is designed to be maintainable by Versetile Avionics Shore. The weapons system is designed to be maintainable by Versatile Avionics Shop Test (VAST).

(See cost data table on page 1391.)

Base for fiscal year 1971 request.—The two aircraft requested in FY-71 will be the first S-3A's funded under PAMN and are planned for ultimate deployment to the operating forces. These two aircraft constitute Lot II in the existing multiyear contract. In addition to the procurement of the aircraft cited above, funds for long lead production items are being requested to provide for an orderly schedule for the FY-72 production lot. Initial Operational Capability (IOC) is presently scheduled for [deleted] Navy's ultimate plans call for [deleted] squadrons of S-3's to the operating by FY 1977.

Service.—Navy.

P-1 Line Item.-29, 30.

Nomenclature.—E-2C Early-Warning Aircraft.

Popular Name.—Hawkeye.

Mission.—Carrier based airborne early warning and control functions in sup-

port of Fleet air defense.

Description.—Capable of all weather carrier operation with UHF radar providing radar target range from [deleted] nautical miles, pressurized crew area, complete data link system (air to surface and interceptor control), simultaneous height finding and search capability, doppler-inertial navigation system, automatic tactical data processing system and Passive Detection System.

The F-2C will have the same airframe and engine as the E-2A/B and will have the following additions: new radar and antenna, Passive Detection System (PDS), Carrier Aircraft Inertial Navigation Systems (CAINS), new high frequency radio, and electronics supported by Versatile Avionics Shop Test (VAST).

(See cost data table on page 1392.)

Basic for fiscal year 1971 request.—FY 71 is the first year of production for the E-2C and the first aircraft will be delivered in [deleted]. The FY 1971 procurement will commence a program to reach an inventory objective of [deleted] E-2C's by FY 1977. The Navy is presently short of E-2 aircraft to fill force level requirements, and this shortage is now being filled by the E-1B. The E-1B is not an adequate AEW platform to meet today's threats and the airframes are over 11 years old. The FY 71 E-2C procurement is required to continue an orderly phasing of adequate airborne early warning forces into the Navy's carrier air wings.

Service.—Navy.

P-1 Line Item.—34, 35.
Nomenclature.—T-2C Trainer Aircraft.

Popular Name.—Buckeye.

Mission.—Land or carrier based sub-sonic basic jet trainer.

Description.—This tandem, two-place, twin engine trainer is employed in the Naval Air Training Command to train student aviators in jet flight, navigation, instrument flying, tactical and formation flight, limited weapons training, field carrier landing practice, night flying and carrier qualification.

(See cost data table on page 1393.)

Basis for fiscal 1971 request.—The T-2C aircraft requested are required to replace overage T-2A's which are now operating at reduced performance and maneuverability due to structural limitations in the wing and landing gear. T-2A's are currently operating on the second 14 month extension to their service life. 36 T-2C's are requested in this budget in order to phase procurement and ease the budget impact in a single year. Accelerated procurement will be required in future years to complete the T-2A replacement and to begin replacing the T-28's which are also operating on extension to service life.

Service.—Navy.

P-1 line item.—36, 37.

Nomenclature—TA-4J Trainer Aircraft.

Popular name.—Skyhawk.

Mission.—An advanced jet trainer used for Navy and Marine student aviator training in instrument flight, familiarization, navigation, formation, weaponry, and carrier qualification.

Description.—The TA-4J is a two-place tandem version of the A-4F except for deletion of weapons and navigation systems which are not necessary for advanced training. The installation provisions are retained so that the aircraft can be converted to a combat configuration. The aircraft will replace the TF-9J in the Advanced Training Command.

(See cost data table on page 1394.)

Basis for fiscal year 1971 request.—The 75 TA-4Js in the FY-71 procurement are required for replacement of TF-9J aircraft in the Advanced Training Command. The TF-9J is well beyond intended service life and must be removed from the inventory for reasons of safety and economy of operation. The Navy goal of establishing an all jet training pipeline to simplify the aircraft inventory and improve the capabilities of the training graduate requires the continued phased procurement of the TA-4J as rapidly as possible.

Scrvice.—Navy.

P-1 Line litem.—UGM-73A.

Nomenolature.—POSEIDON Fleet Ballistic Missile System.

Popular Name.—POSEIDON Missile.

Mission/Description.—To develop and deploy a flexible sea-based Fleet Ballistic Missile Weapon System to provide a highly invulnerable offensive weapon as a primary deterrent to enemy initiation of surprise nuclear attack, capable of inevitable retaliation against specified targets. POSEIDON is a two stage solid propellant missile with improved accuracy, larger payload than POLARIS and with multiple independent re-entry vehicles.

(See cost data table on page 1395.)

Service .- Navy.

P-1 Line Item.—73.

Nomenclature.—AIM-7E/F Guided Missile, Air Intercept.

Popular Name.—SPARROW.

Mission.—Air-to-air guided missile to destroy airborne targets in all-weather from all aspects.

Description.—A semi-active, supersonic missile currently launched from F-4 aircraft, with a 360° attack capability offering high single-shot-kill probability against high performance aircraft at altitudes from sea level to [deleted] ft. Incorporates home-on-jam capabilities. Is planned for use on F-14, and will be one of the Navy's primary piloted aircraft defense missiles through 1975. The AIM-7F has improved ECM capabilities, better reliability, greater range, and a larger warhead than the current AIM-7E.

(See cost data table on pages 1396–1398.)

Basis for fiscal year 1971 request.—The [deleted] AIM-7E-2 and [deleted] AIM-7F missiles in this request will partially offset SPARROW air-to-air and surface-to-air expenditures during CY 1971-1972. Some asset draw-down will occur and inventory objectives will not be met. However, this request will provide the highest readiness level possible within the available funding. The [deleted] AIM-7F will provide for orderly phase in of this new missile into the inventory.

Service.-Navy.

P–1 Line Item.—75.

Nomenclature.—AIM-9G/H, Guided Missile, Air-Intercept.
Popular Name.—SIDEWINDER 1C IR.

Mission.—Air-to-air missile carried by high speed fighter and attack aircraft

for pursuit curve attacks against enemy aircraft.

Description.—Supersonic, infra-red homing missile. Lethal radius 17 ft.; day and night capability. The -9G offers an increased lead acquisition capability over the -9D with incorporation of Sidewinder Expanded Acquisition Mode (SEAM). The -9H includes the SEAM mode plus new solid state electronics which will provide greater reliability and repairability.

(See cost data table on page 1399.)

[Deleted.]

Basis for fiscal year 1971 request.—The [deleted] AIM-9H missiles in this request will offset SIDEWINDER Training expenditures during CY 1971-72. The total SIDEWINDER inventory objective will be met, including however, obsolescent AIM-9B's. This program represents orderly replacement of obsolescent weapons and is the first full production of the new AIM-9H solid state SIDEWINDER.

Service.—Navy.

P-1 Line Item.-76.

Nomenclature.—AIM-54A. Guided Missile. Air Intercept.

Popular Name.—PHOENIX.

Mission.—Air-launched missile, to kill multiple air targets.

Description.—A supersonic, all-weather, long-range missile coupled with target handling capabilities [deleted]. Provides long-range [deleted] stand-off capability. Six missiles can be carried aboard the F-14A.

Near simultaneous launch is possible against [deleted] targets in an all-

weather, heavy jamming environment.

(See cost data table on page 1400.)

Basis for FY 1971 Request.—[Deleted] PHOENIX missiles have been requested in the FY-71 budget to continue firings of test prototype and value engineered missiles to enable the PHOENIX missile and the AWG-9 weapons control system to meet the F-14 initial operational capability (IOC) in April 1978. Included in this request are the missiles for fleet operational evaluation. Failure to procure these missiles and conduct the required test and evaluation will result in deploying the F-14 without the primary weapon for fleet and area defense. The PHOENIX missile is part of the F-14 development program which has been structured on the basis of a low risk, least cost and earliest possible IOC.

Service. Navy

P–1 line item. 77

Nomenclature. AGM-45A, Guided Missile, Air-to-Surface

Popular name. SHRIKE

Mission. All-weather, supersonic, anti-radar, air-to-surface guided missile, that

will [passively home on and destroy or suppress enemy radar systems].

Description.—The missile is launched and boosted on a ballistic flight path toward the target. When the missile descends to an altitude of [deleted] feet, the control system activates the [deleted] enabling the missile to home on the radiating antenna.

(See cost data table on page 1401.)

Basis for fiscal year 1971 request.—Three versions of SHRIKE are contained in the FY-71 request—AGM-45A-4, -6 and -7. The seeker heads are designed for attacking radars in the [deleted] respectively. Although a sufficient inventory of the [deleted] missile is available, both the Navy and the Air Force are in short supply of the newer versions in this year's request. They are needed to counter the extensive land and sea based radar capabilities [deleted].

Current SHRIKE assets are Southeast Asia oriented and meet requirements for that area. Procurement of these FY 1971 [deleted] missiles is required to prevent

Navy forces from being vulnerable [deleted] in Europe and other areas.

Service.-Navy.

P−1 line item.—79.

Nomenclature.—AGM-53A, Guided Missile, Air-to-Surface.

Popular name.—CONDOR.

Mission/Description.—Air-to-surface guided missiles, will allow attack aircraft to accurately deliver a warhead [deleted] without exposing the launch aircraft to the effective envelope of known and predicted enemy surface-to-air defense systems. CONDOR is a medium range, supersonic, cruise missile with a solid propellant motor, a conventional [deleted] warhead, and electro-optical guidance. It carries a television camera which views the area ahead of the missile.

(See cost data table on page 1402.)

Basis for fiscal year 1971 request.—The [deleted] missiles requested in FY-71 represent the first production procurement of CONDOR. They are required to complete the operational evaluation tests of the developed weapon to prove its tactical feasibility in an operational environment. [Deleted.] We want to continue with this weapon system and have confidence that it warrants production.

Service.—Navy.

P-1 line item.—83.

Nomenclature.—PAMN—Other Missiles 4, STANDARD Missile, Extended Range.

Popular name.—STANDARD ER.

Mission/Description.—A supersonic extended range missile which provides allweather anti-aircraft and surface-to-surface armament for cruisers, aircraft carriers and guided missile frigates and incorporates advanced solid-state electronics and engineering concepts. STANDARD ER is able to defend against high performance aircraft targets flying at radial speeds from [deleted]. It will also operate effectively against sophisticated electronic countermeasures.

(See cost data table on page 1403.)

Basis for fiscal year 1971 request.—Requirement for the FY 71 procurement is calculated to meet approved inventory objectives and firing allowances. This is the fourth increment of a competitive multi-year fixed price contract initiated in FY 67. The FY 71 procurement of [deleted] STD ER continues the phased replacement of TERRIER in [deleted] frigates.

Service.—Navy.

P-1 Line Item.—81.

Nomenclature.—PAMN—Other Missiles 5, STANDARD Missile, Medium Range.

Popular Name.—STANDARD MR.

Mission/Description.—A supersonic medium range missile which provides allweather, anti-aircraft and surface-to-surface armament for destroyers and incorporates advanced solid-state electronic and engineering concepts. STANDARD MR is able to defend against high performance aircraft targets flying at radial speeds from [deleted]. It will also operate effectively against sophisticated electronic countermeasures.

(See cost data table on page 1404.)

Basis for fiscal year 1971 request.—Requirements for the FY 71 procurement are calculated to meet approved inventory objectives and firing allowances. This is the fifth increment of a competitive multi-year fixed price contract initiated in FY 67. The FY 71 procurement of [deleted] STANDARD MR's continues the phased replacement of TATAR in [deleted] cruisers and [deleted] destroyers.

Service.—Navy.

P-1 line item.—85, 86.
Nomenclature.—UUM-44A-2 SUBROC.
Popular name.—SUBROC.

Mission/description.-Provide a quick reaction long stand-off submarine launched weapon for the destruction of enemy submarines and surface ships. The missile is launchable from the standard 21" diameter torpedo tube, is inertially guided, and carries a nuclear payload. It was designed to have a high kill probability against a strong hull (deep depth) submarine.

(See cost data table on page 1405.)

Basis for fiscal year 1971 request.—SUBROC is an in-service weapon system that can be used effectively against all types of submarines. It is currently operational on the PERMIT/STURGEON Class nuclear powered attack submarines and is planned for future classes. Procurement of these missiles is required to continue approved operational training and surveillance programs. SUBROC is being built at [deleted] which will adequately support war and training requirements projected through [deleted]. In FY 71 we were able to reduce the procurement quantity to [deleted] missiles in order to effect a one time cost reduction in the funding year. This is based on accelerating FY 72 funded deliveries and providing long lead time items this year to supplement the new twelve months lead time for FY 72 procurement. All subsequent production lots will then follow the same advanced long lead pattern.

A-4M COST DATA

millions)	
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Dollars	

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	Quantity Amount	Amount	Say year 1968 and prior Piscal year 1969 Fiscal year 1970 Fiscal year 1971 Quantity Amount Quantity Amount Quantity Amount Quantity Amount Quantity Amount Quantity	Amount	Quantity Amount	Amount	Quantity An	Amount	Quantity	Current	Escalated dollars
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et calendar year program						6.69		46.8			
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D I & E. III.COM. obal program cost. 174, 9 174,										174.3	174.7
otal additional costs	77 77									7.7	7.7

or escalated material and labor costs. "Escalated dollars" column expresses costs with an overall average escalation/inflation factor of 0.2 percent per year.

Total additional costs.

1 Reflects program through fiscal year 1975.
2 "Current dollars" column expresses costs in constant fiscal year 1970 dollars without inflation

A-6E COST DATA

[Dollars in millions]

Fiscal year 1969 Fiscal year 1970 Fiscal year 1971 Amount 3										Current esti	Current estimate, total program ¹	ogram 1
Tocal year 1500 and protections Tocal year 1500 Tocal year 1		50	1000	1	901	1000	0.00	1000	. 1501 .		Amour	it 3
Quantity Amount Quantity Amo		riscal year 150	o and prior	riscai year	1303	riscal year	0/61	riscal yes.	1/61	•	Current	Fereistad
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2.3 2.3 2.2 85.1 18.1 19.0 21.6 19.06.4 1,308.4	Procurement cost					12	\$88.3 7.4	12	\$114.8	[Deleted]		1, 278. 1 Deleted
Net calendar year program 2.3 2.3 3.6 2.3 3.6 2.3 3.6 2.3 3.6 3.6 2.3 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6 3.6	Less: advanced procurement								23		in and	
Advanced procurement calendar year 3.5 5.5 5.5 5.5 5.5 5.5 5.5 5.5 5.5 5.5	Net calendar year program						8.28		112.5			
Total obligational authority 116.1 140.6 1,278.1 19.0 21.6 1,240.6 1,278.1 19.4 1.1.1 1.1.	Advanced procurement calendar year				55.55		2.3		9.6			
R.D.T. & CLO. 107.9 178.4 R.D.T. & CLO. 107.9 178.4 R.D.T. & CLO. 107.1 & C.T.	Total obligational authority				5.5		28.		116.1		1, 140.6	1, 278. 1
MILCON Note program cost 1, 300, 4 1, 457, 5 Average program unit cost Deleted Deleted Deleted	ROT & E						13.0		61.0		107.0	F .R/T
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Average program unit cost	Total program cost										1, 308, 4	1,457.5
	Average program unit cost			:							[Deleted]	[Deleted,

escalated material and abor costs. "Escalated dollars" column expresses costs with an overall average escalation/inflation factor of 1.6 percent per year. 1 Reflects program through fiscal year 1978. 3 "Current dollars" column expresses costs in constant fiscal year 1970 dollars without inflation or

Google

EA-6B COST DATA

[Dollars in millions]

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0101	1970	Amount	\$200.1	٠.	-		25.0	1.0		
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	Fiscal year 1968 and prior	Quantity	•							
			Procurement cost	Less advance procurement	Net calendar year program. Advance procurement calendar year	Total obligational authority	Initial spares R.D.T. & E	MILCON Tetal program cost	Av. 18ge program unit cost.	lotal additional costs

or escalated material and labor costs. "Escalated dollars" column (SAR dats) expresses costs with an overall average escalation/inflation factor of 1.5 percent per year. I Reflects program through fiscal year 1975.

2 "Current dollars" column expresses costs in constant fiscal year 1970 dollars without inflation

A-7E COST DATA

(Dollars in millions)

									Current esti	Current estimate, total program 1	ogram i
	Fiscal year 1968 and prior	8 and prior	Fiscal year 1969	1969	Fiscal year 1970	1970	Fiscal year 1971	1761		Amount 3	:
	Quantity	Amount	Quantity	Amount	Amount Quantity Amount	Amount	Quantity	Amount	Quantity	Current dollars	Escalated dollars
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Advanced procurement, calendar year— Total obligational authority Total obligational authority Total obligational authority Total obligational authority R.D. T.&E R.D. T.&E R.D. T.&E		28.69.3 2.69.3 2.69.3 3		9.55.7. 9.4.7. 9.6.0.0.		104.4 104.0 3.0	105.2	105. 2 27. 8	55. 2 27. 8	1, 311. 0 209. 7 19. 8	1, 336.4 211.8 19.8
microtal program cost. Average program unit cost. Total additional costs.										1, 540, 5 [Deleted] 50, 1	1, 568. 0 [Deleted] 50. 1

or escalated material and labor costs. "Escalated dollars" column (SAR deta) expresses costs with an overall average escalation/inflation factor of 1.4 percent per year, ı Reflects program through fiscal year 1975. 3 "Current dollars" column expresses costs in constant fiscal year 1970 dollars without inflation

AV-6B COST DATA

[Dollars in millions]

Current estimate, total program 1

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	Quantity	Amount	Amount Quantity Amount	Amount	Quantity Amount Quantity	Amount	Quantity	Amount	Quantity	dollars	dollars
Procurement cost.					12	\$42.3	18	296.2	[Deleted]	Deleted	Deleted
age procurement unit cost					12	42.3	18	: : : : : : : : : : : : : : : : : : : :		Description	[Date(an)
Total objects 193 Deleted Delete					12	42.3 15.3	9	103.1	[Deleted]	[Deleted] 82.7	[Deleted] 85. 1
# 5 C											
Total program cost Deleted Average program cost Deleted Average program unit cost Deleted Deleted										[Deleted] Deleted	Deleted

tion or escalated material and labor costs. "Escalated dollars" column expresses costs with an overall average escalation/inflation of 0.5% per year. r Reflects program through [deleted]. 3 "Current dollars" column expresses costs in constant fiscal year 1960 dollars without infla-

F-14A COST DATA

Dollars in millions!

Current estimate, total program 1

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	DOCT IBOK IBOCI I		lead lead	200	local year	2/61		1761	'	Current	Forelated
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Amount Quantity	dollars	dollars
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							3	19.9		7.1	9
st calendar year program	7.8						26		517.0		
vanced procurement calendar year						ε	}				
tal obligational authority								577.1		5.009.4	6.100.0
tialspares										742.0	861.6
D.T. & E. & LCON		51. 0		\$173.5		\$491.5		324.2	12	1, 266.6	1, 312. 0
Otal program cost										7,018.0	8. 273. 6
Average program unit cost. 11.4 Cotal additional costs.										9.7	11.4

a includes F-14A/B.
4 \$8.5 million advance procurement necessary in fiscal year 1970. 1 Reflects program through fiscal year 1978.

a "Current dollar" column expresses costs in constant fiscal year 1970 dollar without inflation or escalated_malerial and labor costs. "Escalated dollars" column SAR deta expresses costs with an overall escalation/inflation factor of 4 percent, per year.

UH-1N COST DATA

[Dollars in millions]

									CULTION BST	Current estimate, total program	
	Fiscal year 1968 and prior Fiscal year 1969	3 and prior	Fiscal year	1969	Fiscal year 1970	1970	Fiscal year 1971	1761		Amount	Ę
	Quantity	Quantity Amount	Quantity Amount	Amount	Quantity Amount Quantity	Amount	Quantity	Amount	Quantity	Quantity Current dollars	Escalated dollars
ost.					62	£34.1	15	\$16.7	[Deleted]	209. 8 [Deleted]	225. 3 [Deleted]
240.70						34.1		16.3			
Total obligations authority 34.1 17.3 209.8 225.3 and a street 2.5 and a s						34. 9.0				209.8 35.5	225.3 37.0
U.D. of E. III (DON otal program cost.										245.3 [Deleted]	262. 3 [Deleted]
										•	2

Total additional costs.

I. Reflects program through fiscal year 1977.

I. Reflects program through fiscal year 1977.

I. Current dollars" column expresses costs in constant fiscal year 1970 dollars without inflation or escalated material and labor costs. "Escalated dollars" column espresses costs with an overall average escalation/inflation factor of 1.2 percent per year.

P-3C COST DATA
[Dollars in millions]

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	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	dollars	dollars	
Procurement cost.	. 24	\$299.8	23	\$246.9	83	\$220.6	12	\$160.2	[Deleted]	2017.9	2131. 4	10
Average production unit cost		16.7	16.7	12.7		22.1				ות פופנפס ות פופנפס	[Deleran]	J
Advance procurement calendar year.		12.7		221							2131 4	'
Initial spates R.D.T. & E.				35.6	2	71.7	71.7	25.3		337.3	35.7 66.7	
MILCON Total program cost Average program unit cost Total additional costs										2421.9 [Deleted] 2.2	2552. 8 [Deleted] 2. 2	

or escalated material and labor costs. "Escalated dollars" column (SAR data) expresses costs with an overall average escalation/inflation factor of 1.2 percent per year. i Reflects program through fiscal year 1978. 3 "Current dollars" column expresses costs in constant fiscal year 1970 dollars without inflation

S-3A COST DATA

(Dollars in militions)

Current estimate, total program 1

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	riscal year 1300 and prior	o and bus	riscai year	5051	riscal year 1970	0/61	riscal year 1971	1/61	•	Cuerant	
	Quantity	Amount	Quantity Amount Quantity Amount	Amount	Quantity	Amount	Quantity Amount Quantity Amount	Amount	Quantity	dollars	dollars
Procurement cost Average procurement unit cost							2	79.0 39.5	193	1,646.2 1,832.	1, 832. 0
Net calendar year program. Advance provincement, subjective was										19.0 7.00	
il obligational authority								101.7			1,832.0
10.1 d. E. 517.1 \$53.5 \$140.4 208.0 6		\$17.1		\$63.5		\$140.4		208.0	9	640.1	656.8
Total program cost Average program unit cost										2,681.7	2, 931. 7
Il additional costs											

or escalated material and labor costs. "Escalated dollars" column (SAR data) expresses costs with an overall average escalation/inflation factor of 3.5 percent per year. i Reflects program through fiscal year 1975 2 "Gurrent dollars" column expresses costs in constant fiscal year 1970 dollars w thout inflation

E-2C COST DATA

[Dollars in millions]

_	1	3	dollars	637.2		37.2	152.0 169.3	3	<u>P</u>	:
program	Amount 2	Feee	9	2	1				<u>.</u>	
College commerce, total program.	Amo	0.02200	dellars	592.2	fnonecol	592. 2	169.2	7 908	Deleted	
	'		Quantity	[Deleted]						
•	1671	1/01	Amount	\$92.3	22.2	112.3	47.7			
	Fiscal year 1971	rises yes	Quantity							
	0.1070	0/61	Amount				\$66.1			
	Floral uses 1970	and land I	Quantity							
	901	2001	Amount				\$25.9			
	Cienal vas	and land I	Quantity							
	Soing bas		Quantity Amount Quantity				\$12.8			
	000 reev length return has 000 reev length	DET 1886 IPOSIL	Quantity							
				Procurement cost.	Net calendar year program.	tional authority	Title 15p4ret D.T. & E. D.T. & E.	(In the constant cost age 5	gram unit cost	onal costs
				Procuremen	Net calend	Total obliga	R.D.T. & E.	MILCON	Average pr	Total addit

esculated material and labor costs. "Excalated dollars" column expresses costs with an overall average escalation/inflation factor of 1.2 percent per yesr. 1 Reflects program through fiscal year [deletad]. 3 "Current dollers" column expresses costs in constant fiscal year 1970 dollers without inflation or

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T-2C COST DATA

[Dollars in millions]

									Current est	current estimate, total profesion	often .	
	Since lead	relate here		960	Clean lead	0701.	Sec. Sec. 13	1071		Amount 9	# 3	
	Quantity Amount	Amount	Quantity Amo	Amount	Quantity	Amount	Quantity Am	Amount	Quantity	Current dollars	Escalated dollars	
Procurement cost.	51	236.2	*	£22.8	*	\$17.5	*	286.7	\$26.7 [Deleted]	478.7	80.2	
Less advanced procurement.				: : : -:						:	•	
Net Calendar year program Advanced programent calendar year		; g-		51.4		17.0						
Total obligational authority 37.6 21.9 17.0 26.7 478.7 566.2 Initial sparee. 9 47.8 51.3 51.3		37.6		21.9		17.0 e.		78.		478.7	963 91.3	
주요 : 교 주요 : 교 패 : 50 m												
Total program cost Average program unit cost										526. 8	3	
Total additional costs.												

tion or exculated material and labor costs. "Escalated Dollars" column (SAR Data) expresses costs with an overall everage escalation/faffation factor of 1.9 percent per year. i Roffects program through fiscel year 1979. 9 "Cerrent Dollars" column expresses costs in constant fiscel year 1970 dollars without infla-

TA-4J COST DATA
[Dollars in millions]

									CULTEIN 0ST	Current estimate, total program	ogram .
	Sign bas 1060	, de la company	0301 2001 [200]	9901	Ciocal sect 1970	0201	Ciocal man 1071	. 101		Amount 3	::
	Quantity	Amount	10	Amount	Quantity	Amount	Quantity	Amount	Amount Quantity	Current dollers	Escalated dollars
rocurement cost. ver age procurement unit cost. ass. Advanced procurement	64	6.67	99	\$63.9 1.1	25	\$92.7 1.2 5.8	75	\$103.9	[Deleted]	1, 107.2	1, 230. 1
Net calendar year program. 48.3 49.2 86.9 101.0 0 3.4 101.0 0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0		84.0.40 8.0.40 8.0.0.80		9.0.0.4 9.0.0.4				101.0 3.3 3.1		1, 107. 2 105. 8	1, 230.1
MILCON Milcon Cotal program cost Average program unit cost Total additional costs										1, 213.0 1. 4 . 5	1,342.

⁸ For modification of 49 F's to J configuration,

R.D.1 & E. MILCON.
Total program unit cost.
Average program unit cost.
Total program unit cost.
Total program through fiscal year 1979.

I Reflects program through fiscal year 1979.
I "Current dollars" column spreases costs in constant fiscal year 1970 dollar without inflation or escalated material and labor costs. "Escalated dollars" column SAR data expresses costs with an overall average escalation/inflation factor of 1.5 percent per year.

POSEIDON COST DATA

(Dollars in millions)

								,	Current est	Current estimate, total program	ogram i
	900			901	1	000	100			Amount 3	14.3
	riscal year 1506 and prior	SING DUIS	riscal year 1909	6061	riscal year 19/0	0/61 1	riscal year 1971	1/61	•	900000	Contabad
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	dollars	dollars
Missile procurement		298.5	[Deleted]	\$361.1	[Deleted]	\$506.2	[Deleted]	\$540.5	Deleted	2, 582, 4	2.696.7
Average procurement unit cost.			Deleted	[Deleted]	Delete	[Deleted]	000	[Deleted]	9	Deleted	Deleted
Net missile cost.		98.5		361.1		506.2	9	540.5	3	2, 582. 4	2,696.7
Automotional authority		98.5	Deleted	361.1	Deleted	506.2	Deleted	5.05		2, 582. 4	2, 696. 7
R.D.T. & E.		F.1		ð		7 O 70 O		o i	9	1,016.0	1,016.0
Total program cost									De et ed	3,673.3	3,787.6
Average program unit cost. Total additional costs.										[Deleted]	Deleted
1 Reflects program through fiscal year 1975. 2 "Current dollars" column expresses costs in constant fiscal year 1970 dollars without inflation	tant fiscal year 1	970 dollars v	vithout inflati	or esca on average	lated materi escalation/i	al and labor offation factor	costs. "Escala of 3 percent	or escalated material and labor costs. "Escalated dollars" column expresses costs with an overall average escalation/inflation factor of 3 percent per year.	column expre	15365 COSts Wi	th an overall

SPARROW COST DATA

[Dollars in millions]

									Current est	Current estimate, total program	gram 1
	201 acc		27 (201)	1000	10013	07010	TOI seen level?			Amount a	 -
	Quantity Amount	Amount	Quantity Amo	Amount	Quantity	uantity Amount	Quantity	Amount	Quantity	Current	Escalated dollars
Missile procurement *	[Deleted]	\$190.7	Deleted	£38. 4	Deleted	taa.7	Deleted	\$52.7	Deleted	1, 035, 0	1, 242,7
Average proutement unit cost. Less: Advanced procurement. Net calendar year program. Net calendar year program.	[Deleted]	190.7	Deleted	38. 4	Delete	33.7		52.7		1,035.0	1,242.7
Advanced procurement calendar year. Total obligational authority	Deleted Deleted	190.7	Deleted	38. 4	Deleted	33.7	Deleted	52.7	Deleted	1, 035. 0	1, 242.7
Initial spares.	78	48.7		3.2				1.4	78	55.5	55. 5
Total program cost Average program unit cost. Total additional costs										1, 090.5 (3.0	1, 298. 2 (3) 70. 8

³ See attachment I for breakout of AIM-7E and AIM-7F costs.

Reflects program through fiscal year 1980.
 "Chiractic folials" column expresses costs in constant fiscal year 1970 dollars without inflation or escalated material and labor costs. "Escalated dollars" column (SAR data) expresses costs with an overall average escalation/inflation factor of approximately 2.5 percent per year.

DETAIL OF AIM-7E AND AIM-7F COSTS

AIM-7E

									Current est	current estimate, total program i	
	Fiers year 1009 and print	P and prior	Ciocal year 1000	990	October 1970	. 1070	Sec. Jacob	. 1071		Amount 2	
	Ouantity	Amount	Ouantity	Ouentity Amount	Oughtity	Amount	Oughtity Amy	Amount	Onentity	Current	Escalated
							600000		(company)		
Missile procurement	[deleted]	\$171.4	[deleted]	£38. 4	[deleted]	\$18.9	[deleted]	\$20.8	[deleted]	268.0	270.4
Average procurement unit cost	deleted		[deleted]	[deleted]	deleted	[deleted]	deleted	[deleted]	deleted	[deleted]	[deleted]
Net missile cost	deleted	171.4	deleted	38.4	deleted	18.9	deleted	20.8	deleted	268.0	270.4
Advance procurement, calandar year	deleted		deleted		deleted		deleted		deleted		*
dos obrigational authority	[deleted]	1/1.4	[deleted]	₹ 98	[deleted]	on eci	[deleted]	20.8	[deleted]	588 .0	270.4
R.D.T. & E	*	18.5							4	18.5	18.5
MILCON Total program cost										i	0 886
Average program unit cost.										Ideleted	[deleted]
Total additional costs.										36.	36.5

² Escalation not applicable to AIM-7E since no procurement in out years.

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•	

Current estimate, total program 1

	Flacet teach	169 and print	an leneil	1000	, leneil	Cieral year 1970	Fiscal vasy 1971	1071		Amount 3	•	
	riseal year 1.	וארשו אפון זאסס פוות חווסו	coet lace lacel	1909	r iscal y	0/61 196	riscal y	1/61 190		Current	Fernished	
	Quantity	Quantity Amount	Quantity Amount	Amount	Quantity	Quantity Amount	Quantity	Amount	Quantity	dollars	dollars	
Missile procurement	[Deleted]	19.3			Deleted	14.8	Deleted	31.9	Deleted	767.0	972.3	
Average procurement unit cost	Deleted				Deleted	[Deleted]	Deleted	Deleted	Deleted	[Deleted]	[Deleted]	•
Less: Advanced procurement	[Deleted]	19.3	9.3		Deleted	14.8	Deleted	Deleted 31.9	Deleted	767.0	972.3	
Advanced procurement calendar year	Deleted				Deleted		Deleted		Deleted			~
Total obligational authority	. [Deleted]	19.3			[Deleted]	14.8	[Deleted]	31.9	Deleted	767.0	972.3	,
R.D.T. & E.M. COM. WHILL COM. WILL COM.	35	30.2	3.4	3.4				1.4	: %	37.0	37.0	
Total program cost. Average program unit cost.										Deleted	1009.3 [Deleted]	
										ò	Š	

tion or escalated material and labor costs. "Escalated Dollars" column (SAR Dats) expresses costs with an overall average escalation/inflation factor of 2.5 percent per year.

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i Reflects program through fiscal year 1980. 2 "Current dollars" column expresses costs in constant fiscal year 1970 dollars without infle-

SIDEWINDER COST DATA

[Dollars in millions]

									Current est	Current estimate, total program	rogram i
		1000		901	1	1070	-	1071		Amount :	. t.
	riscai year 1	riscal year 1966 and prior		riscal year 1505	LISCAL	riscal year 1970	riscal)	riscal year 19/1		Current	Fernished
	Quantity	Quantity Amount	Quantity	Quantity Amount		Quantity Amount	Quantity	Amount	Amount Quantity	dollars	dollars
Procurement cost Average procurement unit cost	Deleted		Deleted Deleted	\$14.6 [Deleted]	[Deleted]	\$32. 0 [Deleted]	[Deleted]	£31. 5 IDeletedi	Deleted	434. 0 [Deleted]	509. 5 [Deleted]
Net missile cost		101.8	Deleted	14.6	Delete	32.0		31.5	Delete	434.0	509.5
Advanced procurement carefular year. Total obligational authority.		101.8	Deleted	14.6	Deleted	32.0	Deleted	31.5	Deleted	434.0	509.5
P.D.T. & E.		52.4		•		•		:		25.4	52.
miliculus Total program cost. Average program unit cost.										503.8 [Deleted]	582.6 [Deleted]
lotal additional costs.										10.7	11.8
i Reflects total program fiscal year 1960 through fiscal year 1980. 3 "Current dollars" column expresses costs in constant fiscal year-1970 dollars without inflation or	il year 1980. int fiscal year-19	170 dollars with	out inflation		ed material ar ion/inflation f	id labor costs. actor of appre	"Escalated do ximately 1.1 p	ollars" column percent per ye	escalated material and labor costs. "Escalated dollars" column expresses costs with an overall average escalateon/inflation factor of approximately 1.1 percent per year.	its with an ove	srall average

PHOENIX COST DATA

(Dollars in millions)

									Current es	Current estimate, total program	rogram 1
	Gines Ives 10	So and print	Legail	Ciecal year 1060	y leneil	Cieral year 1070	Jevel	Ciscal uses 1071		Amount 3	ıt:
	riscal year 1900 and prior	so allo prior	200	year 1505	1850	0/61 194	C BASE	1/61 192	•	400000	Constabad
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	dollars	dollars
Missile procurement	Deleted	\$29.4	[Deleted]				[Deleted]	\$87.6	Deleted	865.4	1002.3
Average procurement unit C	Deleted			eted			Deleted	[Deleted]	Deleted	[Deleted]	[Deleted]
Net missile cost	Deleted	29.4	_	55.7			Deleted	87.6	Deleted	865.4	1002.3
Advanced procurement. Total obligational authority. (Deleted)	Deleted	29.4	Deleted	55.7	55.7		Deleted	87.6	Deleted	865.4	1002.3
Initial spares	37	344.2		33.7		\$17.5		, e, eo,	8.5 37	416.4	416.4
Total program cost.										:	1501.2
Average program unit cost Total additional costs.										[Deleted]	[Deleted]

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¹ Reflects program through fiscal year 1977. ³ "Current dollars" column expresses costs in constant fiscal year 1970 dollars without inflation

or excalated material and labor costs. "Excalated dollars" column (SAR data) expresses costs with an overall average excalation/inflation factor of approximately 1.9 percent per year.

SHRIKE COST DATA

[Dollars in millions]

Current estimate, total program 1

	Of read leading	o page 0	, leasi	1060	Cieral year, 1070	0201	Figure 1977	1671		Amount 3	1 2
	riscal year 1500 and pilot	o and ping	LISCAL JEST 1909	2021 190	Listal Jea	13/0	riscal y	1/61 199		Current	Forelated
	Quantity	Amount	Amount Quantity	Amount	Quantity	Amount	Quantity	Amount	Amount Quantity	dollars	dollars
Missile procurement	Deleted	\$110.3	Deleted	\$20.9	\$20.9	\$.5	Deleted	\$10.9	Delete	\$331.0	\$389.3
Less advanced programent	_		Deleted	ineleled			Deleted	[Deleter]	Deleted	foetered	[Deleter]
Net missile cost	Deleted	110.3	Deleted	20.9	6	9.5	9	10.9		331.0	389.3
Total obligational authority	Deleted	110.3	Deleted	20.9	0.9	9.5	Deleted	10.9	Deleted	331.0	389.3
R.D.T. & E.				£.;	6.1	1.7	,	1.0.	1.0		
mit cong		7.								430, 1	490.6
Average program unit cost. Total additional costs.										[Deleted] 5. 4	Deleted 6.3

escalated material and labor costs. "Escalated dollars" column (SAR data) expresses cost with an over-all average escalation/inflation factor of approximately 2 percent per year. 1 Reflects program through fiscal year 1980. 3 "Çurrent dollars" column expresses costs in constant fiscal year 1970 dollars without inflation or

CONDOR COST DATA

[Dollars in millions]

Wissile procurement 3. Current Para year 1500 Current Para year 1500 Current Escalated Quantity Collected Quantity Col		Ciscol teast 10	soire bee 62	Fiscal Land	900	een leseil	0,00	- leading	1011		Amount 3	ب :
Deleted \$28.5 Deleted 150.0 Deleted Deleted Deleted Deleted Deleted Deleted Deleted Deleted Deleted 150.0 Deleted 28.5 Deleted 150.0 Deleted 28.5 Deleted 150.0 Deleted 28.5 Deleted 150.0 Delet		Quantity	Amount	Quantity	Amount	0	Amount	Quantity	Amount	Quantity	Current dollars	Escalated dollars
Deleted Deleted Deleted Deleted Deleted Deleted Deleted Deleted Deleted Deleted Deleted Deleted Deleted Deleted 150.0	Viceile provincement 3							Detelo	23 62	1	95	3 331
Deleted 28.5 Deleted 150.0	Average procurement unit cost.							000	[Deleted]	2	[Deleted]	[Deleted]
Deleted Deleted Deleted 150,0	Not missile cost.							Deleted	28.5	Deleted	150.0	166.6
\$102.6 \$14.1 \$8.0 Ushered 9.2 174.1 19.2 174.1 19.2 174.1 19.2 174.1 19.2 174.1 179.2 174.1 179.2	Advanced procurement Total obligational authority							Deleted	28.5	Deleted	150.0	166.6
333.3 Deleted	R.D.T. & E.		\$102.6		\$14.1		58.0	Deleted	23.3	Deleted	9.2 174.1	10.4
	Total program cost Average program unit cost Total additional costs										333. 3 [Deleted] 1. 6	351. 1 [Deleted] 1. 9

STANDARD (PAMN) COST DATA

[Dollars in millions]

									Current esti	Current estimate, total program	gram I
	Ciocal year 1069	roise bus	0901 2001 10013	996	e de la constante de la consta	0,010	Figure 1971	. 1291		Amount 2	=
	riskal year 1566 and prior		- 1	1303	LISCAL JEST 1970	0/61	riscel year	1761	•	Custons	Constabad
	Quantity	Amount	Amount Quantity	Amount	Quantity	Quantity Amount	Quantity	Amount	Quantity	dollars	dollars
Missile program. [Deleted] \$102.6 [Deleted] \$40.5 [Deleted] \$40.5 [Deleted] \$40.5 \$40.	[Deleted]	\$102.6 [Deleted]	[Deleted]	-	\$35.6 [Deleted]		\$32.1 [Deleted] Deleted	\$33. 2 Deleted	\$33.2 [Deleted]	338. 6 IDeletedi	353. 6 Deletedi
Less advanced procurement. Net missile cost.		102.6	102.6	٠,	35.6	32.1	33.2	33.2		338.6	353.6
Advanced procurement Total obligational authority		102.6		35.6		32.1	12.1	33. 2	33. 2	338.6	353.6
R.D.T. & E.S. Total Lorgen Foet		36.8				1.9		1.7		53.5 23.5	83.5 40.5
Average program cost Total additional cost (modified).										[Deleted]	[Deleted] 13.6

age escalation/inflation factor of 3 percent per year. * Development for 27D MSL was pursued as a single program; therefore, costs are not identifiable to ER and MR Individually—80 percent allocated to each missile. 1 Reflects program through fiscal year 1975.
2 "Current dollars" column expresses costs in constant fiscal year 1970 dollars without inflation or secalated material and labor orsis. "Escalated dollars" column expresses costs with an overall aversecabled material and labor orsis."

STANDARD (PAMN) COST DATA

[Dollars in millions]

									Current est	Current estimate, total program	ogram 1	
	9901		-	900	-	0,01	1			Amount 2	1:	
	riscal year 1906 and prior	and prior	riscal year 1303	1303	LISCS: JEST 1970	0/61 1	LISCAL YEAR 1971	1/61	•	900000	Canalahad	
	Quantity	Amount	Amount Quantity	Amount	Amount Quantity Amount	Amount	Quantity Amount	Amount	Quantity	dollars	dollars	
Missile program	[deleted]			\$18.1 [deleted]	[deleted]	\$24. 4 [deleted].	\$18.1 [deleted] \$24.4 [deleted] [deleted]	\$25. 4 [deleted]	\$25.4 [deleted] [deleted]	\$223. 5 [deleted]	\$237. 0 [deleted]	
Less: Advanced procurement Net missile cost			36. 4	18.1	18.1	24.4	f. 4	25.4	25.4	223. 5	237.0	_
Total obligational authority		36.4		18.1	8.1	24.4		25.4	25.4	223. 5	237.0	
RD.T. & E.		36.		: : :e:		:	1.9	-	1.6	53.3	53.3	
Total program cost Average program unit cost Total additional costs (modified)										278. 1 [deleted] 13. 1	291. 6 [deleted] 15. 5	

average excatation/infation factor of 3 percent per year.

* Development for STD MSL was pursued as a single program, therefore, costs are not identifiable to ER and MR individually—30 percent allocated to each missile. ¹ Reflects program through fiscal year 1975. Procurement is beyond fiscal year 1975 to compensate for yearly fleet training firings and to account for introduction into the fleet for new ships.
² "Current dollar" column expresses costs in constant fiscal year 1970 dollars without Inflation or escalated material and above costs. "Escalated dollar" column expresses costs with an overall processes.

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SUBROC COST DATA

[Dollars in millions]

ogram 1	t 2	Constabad	dollars	350. 5 [Deleted]	350.5	350.5	226.1	594. 4 [Deleted] 10. 6
Current estimate, total program 1	Amount 2	Question 6	dollars	337. 5 [Deleted]	337.5	:	226.1	581.4 [Deleted] 10.2
Current est			Quantity	\$15.4 [Deleted] [Deleted]	15.4		88	
	1671	1761	Amount			17.0		
	TOT seen feed?	Bac Bac	Amount Quantity Amount	\$25.6 [Deleted] [Deleted]	25.6	25. 6		
	0.1070	0/61	Amount	\$25. 6 [Deleted] .	25.6	25.6	9.1	
	City Jack 1920	LISCH JES	Amount Quantity	[Deleted]	59.6 26.3		7. 0.1	
	1969	1303	Amount	\$26.3 [I	26.3		e	
	e di la considera	rised year 1909	Quantity Amount Quantity	\$159.6 [Deleted] Deleted]	159.6	59.6	226. 1	
	e direction	o alici pilot	Amount	<u>6</u> 0	159.6	159.6	226.1	
	Cincal Local	riscal year 1300 and prior	Quantity	[Deleted]			88	
				Missile procurement Average procurement unit cost Lese: Advanced procurement unit cost Lese: Advanced procurement	Net missile cost	Advanced procurement calendar year Total obligational authority	R.O.T. & E. 89	Total program cost. Average program unit cost. Total additional cost.

¹ Reflects program through fiscal year 1975. Navy total program is identical to FYDP through fiscal year 1975 is based on reaching Navy Inventory Objective, Quantity and phasing are constrained by current fiscal guidance and influenced by plazs for follow-and development. Force objectives/cital quantity, phasing and cost are subject to change during PRS cycle as National strategy, fiscal guidance and objectives change. In addition the attainment of inventory objectives and

material for fleet training is matched with the submarine building schedule. Objectives will be revised as new submarines become operational.

2. "Current dollars" column expresses costs in constant fiscal year 1970 dollars without inflation or escalated material and labor costs. "Escalated dollars" column expresses costs with an overall average escalation/inflation factor of 3.0 percent per year.

COMBAT AIRCRAFT

Admiral Connolly. The "M" version of the Skyhawk is in its second year of production. Forty-nine were authorized for the initial buy last year; only 41 were funded. The difference was an equal cost trade off to provide improved configuration and more capability.

Twenty-four of these single place, light attack jets in fiscal year 1971 will continue the orderly introduction of A-4Ms into Marine

forces.

The sum of \$34.1 million is requested for 24 A-4M Skyhawks. In addition, \$21.2 million is requested to fund initial spares and special

support required for the various A-4 sites.

I invite your attention to the data slide shown here. Under "FY 1971 Request" the dollars represent all PAMN costs broken out as indicated. I would like to emphasize that only the flyaway cost and prior year advance procurement are tied in direct proportion to this year's requested quantity. "Advance Procurement Current Year" provides long-lead funding for next year's planned request. A portion of requested support equipment and initial spares will go to outfitting support ships and air stations, independent of the quantity of aircraft in this year's buy. Other spares and support items in the aircraft request represent short lead procurement time-phased to complete production of last year's buy. Thus, you can see that even if zero quantity of any given aircraft is to be procured this year, a portion of the initial spares and support equipment for that aircraft would still be required. These residual cost figures are available and can be furnished for the record as desired, Mr. Chairman. The "Production Unit Cost" shown here represents the total PAMN investment funds in fiscal year 1971 divided by the number of aircraft. "Flyaway Unit Cost" is the cost of the completely equipped aircraft at the head of the runway ready to take off.

Residual cost figures in fiscal year 1971 PAMN for aircraft spares and support equipment programed for prior year buys, even if fiscal

year 1971 aircraft quantity were zero:

Model	Spares and re- pair parts por	Special sup- rt equipment	Total
4M	10. 2 18. 3	\$8. 7 31. 4 28. 6 6. 7	\$9, 8 41, 6 46, 9 6, 7
7E	8. 5 2. 0 2. 8	6.0	14. 5 2. 0 2. 8
I-1N 3C 2C	. 4 8. 6	3. 3 41. 0	3. 7 49. 6
HJ	.4	5. 8	6.2
Total	52. 3	131. 5	183. 8

On the right side of the "Program Status" section you will note the heading "Total PAMN Program." Items under this heading refer to total programed procurement for all years. Details on procurement quantities programed for the out years including inventory objective, R.D.T & E. and MILCON, and total program costs are available for each item on a second data slide, if you desire to see them.

Please note that the total costs I am showing you are in current—fiscal year 1970—dollars. Perhaps you have seen other sources which project these costs in escalated dollars—certain of the selected acquisition reports for instance. There are good reasons to support both methods of presentation. My purpose in presenting current dollars is to provide a constant base for comparison of all the PAMN total programs. Some programs reach their inventory objectives in the next year or two, others extend on considerably longer. We cannot know precisely how the economic trends will influence costs over those periods. We certainly hope and expect that inflationary factors will have been checked. We feel that the use of today's dollars at this time will give you the clearest picture of the scope of the various programs as we see them today.

A-6E

The A-6 has an incredible carrier landing safety record since it came to the fleet, which now spans over 45,000 arrested landings without an accident. We expect the Intruder to remain the bulwark of Navy all-weather attack capability for many more years. Better reliability and performance to span the period ahead have been incorporated in the E series of the A-6 in the form of improved radars, digital computers, instrumentation, and weapons release systems.

These valuable and versatile aircraft are badly needed; we are requesting \$64.4 million for 12 Intruders. Support and training equipment along with advance procurement funding bring the total

request to \$137.7 million.

EA-6B

This four-place electronics warfare version of the Intruder specifically designed for tactical jamming, has undergone an evolution of improvements in capability [deleted]. Using a [deleted] system to [deleted] automatically train [deleted] jammers, it radiates [deleted] more power than any other airborne jamming system in the U.S. inventory.

We expect large payoffs in terms of fewer aircraft and pilot losses

and greater effectiveness of our striking aircraft.

Pilots with combat experience over North Vietnam will vouch for

the necessity of the protection offered by this type of airplane.

The sum of \$115.9 million is requested for 8 EA-6B's; with associated initial spares, support and long lead funding amounting to a total request of \$188 million.

AV-6B HARRIER (NOW REDESIGNATED A-8A)

This tactical VSTOL aircraft has been operational with the Royal Air Force since the spring of 1969.

Three Marine pilots are flying with British squadrons to gain Har-

rier VSTOL experience.

A licensing agreement has been reached which covers a phased plan to shift complete manufacture and assembly of the Harrier to the United States. Know-how and technology have largely been acquired with the fiscal year 1970 procurement, eliminating dependence on United Kingdom experts for technical and engineering support. This has not been accomplished for nothing, however, as tooling, engi-

neering and associated costs have raised required funding. We believe it is still a good investment and is an opportunity not otherwise available for naval aviation to take successful early step forward in VSTOL operations. It also provides the opportunity for American industry to gain experience and expertise in this new field.

We are requesting \$76 million this year to procure 18 Harriers. This will round out the first operational squadron started last year and provide the required training nucleus; \$42.3 million is also needed for special support and training equipment, initial spares and long-lead funding.

A-7E

During recent carrier trials, an A-7E with the new TF-41 engine was launched with the heaviest external ordnance load ever catapulted from a carrier deck on a single engine aircraft—[deleted] pounds.

Much higher bombing accuracy with A-7E shown only by test flights this time last year, has now been achieved on a wide scale by pilots in operational squadrons. The A-7E will deploy in April [deleted].

Thirty-nine aircraft in fiscal year 1971 provide attrition replacement and do not raise the overall A-7 inventory.

The sum of \$72.8 million is requested for 30 A-7E's, along with initial spares and support for a total program of \$133 million.

Mr. Chairman, regarding the F-14, this is a behaving program. Chairman STENNIS. Will you submit a statement on that?

Admiral Connolly. Yes, sir. (The information follows:)

I would like to give you my personal view on our progress with the F-14. We are now within nine months of first flight and we have a good feel for where we stand: and I say as of this moment that we have no major problems. I don't mean to imply that we will introduce this airplane without problems but I do say that, as far along as we are now, there is nothing major in sight and we are in better shape on this airplane at this point in time than any other development program I have been associated with. We are within 1% on the empty weight. This means that we may be 300 lbs. over against a 35 thousand pound total. When you consider take-off gross weight on the order of 53-54 thousand pounds, this is really insignificant and a good omen. We are on schedule for first flight next January and we have encountered no cost growths. We have confidence in making the first flight on time, and I expect success on the first flight. We have over 25 thousand hours of wind tunnel data and the various mechanical systems are being worked in the mock-up right now. Some of the Committee and Staff have been to Grumman's plant and I believe you were impressed, as I was, with the fine effort that is apparent there. The Grumman people are working hard and they are working carefully and meticu-

I think the Pratt & Whitney, General Electric competition for the engine was a fine example of the benefits we get from competitive procurement. Pratt & Whitney was perhaps a little lean and hungry; they hadn't won in quite awhile. Their performance in this competition was impressive. It was a clean win. RADM Walker, here with me today, was the Navy member of the Source Selection Board and he can testify to the particulars of the competition. The choice was made by military experts, endorsed by Secretaries Seamans and Chafee and approved by the Secretary of Defense. It was a clean, healthy competition. We expect to get 28 thousand pounds of thrust from the Navy version, giving us 56 thousand pounds per F-14 installation. This will give us a thrust-to-weight ratio [deleted] for take-off in the SIDEWINDER/SPARROW equipped F-14. Remembering that in the air the weight of the airplane will be down to the 45-50 thousand pound range after some flight time, you can see that pilots will enjoy a thrust-to-weight ratio [deleted]. We have never known this kind of thrust in a fighter aircraft before. The maneuvering envelope that it will support is going to be a tremendous advantage and challenge to our fighter pilots. With the kind of thrust-to-weight ratio I have been talking about this airplane can climb vertically. We have confidence that this aircraft will live up to our expectations.

F-14A

Admiral Connolly. The first F-14A aircraft is beginning to take shape. We continue to keep a tight watch on weight and performance milestones as well as cost. The current empty weight is within 1 percent

of that specified.

Complete weapons system integration and testing was underway in January using the System Integration Test Station at Point Mugu. Other systems—fuel, wing sweep, landing gear, flaps and slats—will have been tested with actual components prior to installation and first flight, which is now less than a year away.

I would like to emphasize that the first 18 F-14's off the line will be produced one per month commencing in January 1971. This will provide 18 months of flight testing before the production rate is raised to

two aircraft per month.

Competition between Pratt & Whitney and General Electric for development and production of the advanced technology engine was just completed in February of this year. Pratt & Whitney was selected as the winner. The Navy and Air Force are working together on this engine. The Navy version is programed to go into production aircraft with the number 68 F-14 in fiscal year 1972. Initial Operational Capability (IOC) will follow in December 1973. The Air Force version will go into their F-15. The engine is on schedule with both Navy and Air Force versions meeting initial test stand requirements. This slide shows the engine operating in afterburner. The Navy version has also been run with the full scale F-14 inlet.

Soviet accomplishments in fighter technology indicate clearly that we should not delay the early 1973 IOC date of the F-14. Present Navy plans call for 28 Navy and six Marine squadrons of F-14's to be in fleet

operation by fiscal year 1980.

The sum of \$389.4 million is requested for 26 F-14A's. Special support and training equipment for the various sites along with initial outfitting spares and long lead funding make up the total request of \$658 million.

UII-1N

The UH-1N Iroquois is the latest model of the famous "Huey" helicopter, incorporating design and equipment improvements. Foremost is the new twin turbine engine configuration which markedly improves reliability, safety, and military effectiveness. The Navy, Marines, and Air Force will use this aircraft in similar configurations. The Canadian Defense Ministry also has ordered [deleted] UH-1N's with options for [deleted] more for their armed services.

The 15 aircraft in this year's request replace Marine UH-1E losses. The Marine Corps has reduced forces by [deleted] in fiscal year 1971 to retain UH-1 light helicopter squadrons in the permanent force structure. A continuing program provides for the eventual operation of [deleted] of these squadrons by fiscal year [deleted].

Eleven million dollars is requested for 15 UH-1N's. An additional \$10.2 million is requested for support, advance procurement, and

initial spares.

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P-3C

The third and latest version of the Orion has only recently been introduced in our fleet ASW squadrons. Its superior capabilities have generated much enthusiasm on the parts of pilots and fleet commanders. The major increase in effectiveness comes from new ASW avionics that utilize computerized displays of collected sensor intelligence.

The quantity of 12 aircraft this year represents a bare minimum to sustain the production base while making some advancement toward inventory objective. It is essential that we continue to modernize our ASW force commensurate with the increasing technological advance-

ments in Soviet submarines.

One hundred fifteen million dollars is requested for 12 P-3's; with initial spares, support, and long-lead procurement for next year bringing the total request to \$168.5 million.

S-3A

The S-3A, in PAMN for the first time this year, is a completely new aircraft planned for delivery to the fleet in [deleted]. It is being designed as a carrier-based system to meet the Soviet threat posed by [deleted] nuclear submarines in the 1975-85 time frame.

TF-34 turbofan engines will enable it to operate efficiently from sea

level to [deleted] feet.

The avionics of the S-3A are oriented to a general purpose digital computer. Sensor output is fed to the computer for solution, storage, and display as desired. The system uses sensor information much more effectively, enabling the crew of four to function as well as a much

larger crew using older equipments.

The S-3A being designed to use [deleted] homing torpedoes and mines as well as [deleted] depth charges. It will provide effective antisubmarine coverage without reliance on land bases. While it replaces the S-2E now in service, the S-3A will be, conservatively. [deleted] times as effective against submarines, and will constitute a completely new concept of carrier-based antisubmarine warfare. Its range, speed, and flexibility will enable sea-based air power to meet a wide spectrum of threat.

Delay in introduction of this aircraft would result in a serious degradation in our readiness to cope with the Soviet submarine threat.

Request for the initial production procurement of two S-3A's is \$48.1 million. We also seek \$30.9 million for special support equipment and \$22.7 million advance procurement to fund long-lead items.

E-2C

Fiscal year 1971 marks the first procurement request for the E-2C Hawkeye which is now in its fourth year to development. It is scheduled for delivery in [deleted] and to go to the fleet in [deleted] when it will commence replacing the old E-1Bs.

Significant improvement in performance encompassed in the new E-2C is badly needed to modernize our airborne early warning and strike control capability. Without the E-2C, by fiscal year [deleted] the Navy would have sufficient E-A2's remaining to support only [deleted] air wings. Planned procurement of [deleted] E-2C's

through fiscal year [deleted] will meet the force requirement. The pro-

curement requested this year starts up the production line.

Request for the initial three E-2C's is \$55.8 million. \$45 million is requested for site support and initial outfitting of spares. An additional \$20 million is requested to fund long-lead items for follow-on

That completes the combat aircraft delineation and we shift now to

trainer aircraft.

The trainer category has two principal models in fiscal year 1971 procurement—the T-2C Buckeye and TA-4J Skyhawk.

T-2C

The T-2C is a twin jet, tandem trainer designed for basic jet training. There is a very urgent need for these aircraft to sustain the basic jet trainer inventory. Older T-2A's are all operating on service life extensions; due to their age and material condition they should be replaced.

An all-jet basic training syllabus will require [deleted] T-2's by the late [deleted]. With pipeline and attrition this means a total pro-

curement of [deleted] T-2C's through fiscal year [deleted].

Request this year for 36 T-2C's is \$27.6 million. This includes funds of \$1.7 million for support and spares.

The TA-4J is a two-seat high performance advanced jet trainer. It is replacing our obsolete F-9 trainers which range from 13 to 18

years of age, many years past their cost-effective service life.

The quantity requested this year constitutes an increment of phased procurement toward a Navy objective of an all-jet advanced training syllabus ultimately operating [deleted] Skyhawk trainers. Pipeline and attrition are estimated to make necessary a total buy of [deleted] aircraft through fiscal year [deleted].

The sum of \$95.3 million is requested for procurement of 75 TA-4J's. Support and training equipment, initial spares and long lead funding

amount to an additional \$12.1 million.

AIRCRAFT MODIFICATION

For safety of flight, \$103.9 million is required.

These safety improvements are designed to decrease accident risk

and to correct deficiencies existing in the inventory.

For improvement in combat capability and survivability, \$25.5 million. These items will increase combat effectiveness and our ability to penetrate high threat areas.

For operational improvements, \$103.4 million. Examples: Installation of the DIFAR sonobuoy equipment in P-3 and S-2 aircraft, and improved identification, friend or foe, IFF, and altitude reporting

equipments to meet FAA safety requirements.

For service life extension, \$5.5 million. The service life extension program is a continuation of prior year programs that aim at modernizing older aircraft to attain additional useful service.

For converting 20 older A-6A's to KA-6D tanker aircraft, \$17.6 million. You may recall that the Congress removed funds for new KA-6D procurement last year and provided instead for the conversion of 16 A-6A's to tankers. So we want to continue doing that.

AIRCRAFT SPARES

The fiscal year 1971 budget requests \$447.4 million for aircraft spare parts and components. Of this total you have already seen \$234.8 million shown separately on each aircraft data slides as initial spares associated with current aircraft series.

Although PAMN spares are funded for budget purposes as a single line item under one budget activity, they actually fall into two categories—initial and replenishment. Initial spares are an outfitting investment and can be repaired and reused. They are provided to the operating bases, carriers, and other sites which will be supporting new or modified aircraft entering the inventory. Also included in the initial spares category is \$55.6 million to fund spares that support our aircraft modification program.

The second spares category is replenishment spares. This procurement is necessary to replace initial and modification spares which are

worn out or are not repairable.

In summary the request this year seeks \$299.4 million for initial spares and \$148 million for replenishment spares.

AIRCRAFT SUPPORT EQUIPMENT AND FACILITIES

Four categories in this budget activity support the aircraft procurement program; \$212.3 million in the fiscal year 1971 request fund these categories.

For component improvement, \$43.1 million. This provides continuing engineering effort to improve aircraft engines. The project also

funds improvements in starters and electrical power systems.

For aircraft industrial facilities, \$27.9 million. This category finances the replacement and restoration of Government-owned machine tools, capital maintenance, and new production equipment necessary for economical and efficient production and rework of aircraft procured under this appropriation. This request does not provide "brick and mortar" facilities.

For common ground equipment, \$96.3 million. This support program is new to PAMN and was formerly funded in the OPN appropriation. It provides funds for the versatile avionics shop test (VAST) systems, aircraft systems trainers, training aids and devices.

For other production charge, \$45 million. This category provides peculiar support equipment for out-of-production aircraft, funds for aircraft camers, modification of weapons system trainers, and other production costs not identifiable with any one specific aircraft model.

Mr. Chairman, that completes the aircraft portion of the request.

I can proceed to the missile program.

LEVEL OF COMBAT AIRCRAFT

Chairman Stennis. We have some questions on this.

Now, there are only 261 aircraft in the bill as compared to 348 last year. That shows a considerable reduction percentagewise. Now, bringing it together, how many of these 261 are combat planes? You can just give the rounded-out figure.

Admiral ConnoLly. 150, Mr. Chairman. Chairman Stennis. 150 are combat planes?

Admiral ConnoLLY. That is right, sir.

Chairman Stennis. And that leaves 111, then, that are trainer

With only 150 combat planes in here, how does that leave the Navy with reference to a stay-even program in future years insofar as mod-

ernity and strength are concerned?

Admiral Connolly. Well, of course, Mr. Chairman, it is a very tight proposition. Combat losses are reduced in Southeast Asia and we have reduced the size of the Navy, we have reduced the squadrons, and this buy is being applied to a smaller Navy than we have been supporting in the past. We have—I almost hesitate to say it—

Chairman Stennis. I don't want you to hesitate. Just give us your frank analysis of where that leaves the Navy. You are entitled to your professional opinion. It will be argued on the floor of the Senate that what you have in here should be cut out and your testimony on how

tight it leaves you will be very relevant and might be convincing.

Admiral CONNOLLY. Well, Mr. Chairman, if we are lucky in our actions, we have got a big safety drive on and safety drives, as I am sure you know, can be successful and then every once in a while your best endeavors in safety go the other way and you have setbacks. But we have this current year—we seem to be on the way to a better record than we have had.

Well, all right, to sum up, this buy is awfully small. It is much

smaller than in other years.

Chairman Stennis. But the question is where does it leave you with

strength and modernity in future years.

Admiral ConnoLLY. I am giving a pretty long answer but I think the inventory will suffer a net reduction of about [deleted] although

the modernity will go up.

Now, the inventory will decline and we will modernize but not at a rate that we would like to modernize. It is not a very impressive buy of combat aircraft but it is a reasonable thing, Mr. Chairman. I want to say that because we have got some expensive new birds.

Chairman Stennis. Yes. In other words, numberwise it is severe on you but so far as modernity is concerned, your score is going up

some.

Is that what you are summarizing?

Admiral Connolly. That is exactly right, and the most important thing in my mind is that this modernity isn't just a covering word. By this I mean we are buying the airplanes we need and without these airplanes we wouldn't be handling the capabilities we know that we

are going to have to come up against. We need these early warning airplanes. We need these jammers. We need these weapons systems.

Chairman STENNIS. You have made that clear. As you go into the modernity line, though, the unit cost substantially increases. That is true; isn't it?

Admiral ConnoLLY. That is exactly right, Senator.

COMBAT AIRPLANE COST COMPARISON

Chairman STENNIS. The average cost of the plane the Navy was getting in last year's bill was \$15 million. This seems mighty high as an average cost but that is what I am told. I think it would be valuable if you can compare the average cost in the budget that is running now as compared to the budget that we are preparing for 1971. If you can't do it today, you can supply it for the record.

(The information follows:)

A comparison of average unit costs between FY 1970 and FY 1971 combat aircraft is shown below. These figures include total PAMN investment costs such as flyaway, support, initial spares and adverse procurement. They do not include operating costs such as replenishment spares, aircraft modification or component improvement.

PAMN COMBAT AIRCRAFT PRODUCTION UNIT COSTS [Dollars in millions]

	Quantity	Total cost	Unit cost
Fiscal year 1970Fiscal year 1971	235	1, 176. 2	5.0
	150	1, 702. 6	11,3

I do not know the source of the \$15 million unit cost figure for FY 1970 aircraft to which you referred earlier; however, the only possible way to derive a unit cost that high for last year's combat aircraft would be to include the 6 F-14's which have since been switched by Congress to RDT&E, and to exclude all the lower cost aircraft such as A-7s and UH-1Ns.

Chairman Stennis. Your chart on cost shows what you call the

flyaway cost which excludes research and development.

I want you to put in the record here a chart showing the total cost. That is what we have to consider and that is a question we have to answer. It is all right to have the charts showing it both ways but we want to know now what the cost is on the basis of total cost. I believe

you have a term you use, program cost.

Admiral Connolly. We have three costs and we have these all—we will give them to the committee in response to what you are asking for. They are in our material. The flyaway costs, a cost that includes flyaway, includes special support, tech services and software and then a third column which includes all the foregoing plus R.D.T. & E. and MILCON, military construction. We will supply that for each airplane, sir.

Chairman STENNIS. All right. I think at this point this ought to go

in record.

(The information follows:)

The following costs are derived from the aircraft Data Sheets provided to both Armed Services Committees, except that unit costs for the total program quantities are shown both in current and escalated dollars.

[Dollars in millions]

						Total pr	ogram unit o	osts 1	
	Fiscal year	r 1971 unit	costs				Procuremen	t program ²	
A/C	Quantity	Flyway ³	Procure- ment 4	Produc- tion ⁵	Quantity	Current dollars	Escalated dollars	Current dollars	Escalated dollars
A4M	24	\$1.4	\$1.9	\$2.3		\$1.9	\$1.9	\$2. 2	\$2.2
A6E	12	5. 4	9. 6	11.5		6. 3	7. 1	7.3	8. 1
EA6B	8	14, 5	18,6	23. 5		16. 1	18. 2	22. 8	24. 8
A8A	18 30	4. 2	5. 3	6.6		4.7	4. 7	5, 4	5. 5
A7E	30	2, 4	3, 6	4.4		3. 1	3. 2	3.7	3. 7
F14A	26	15.0	19. 9	25, 3	l J	7. 1	8. 6	9. 7	11. 4
UH1N	15	. 7	1. 1	1.4	ideletedi	. 8	. 9	. 9	1.0
P3C	12	9.6	13. 3	14.0	(-0.0.00)	10.5	11. 1	12.6	13. 3
S3A	12	24. 1	39. 5	50.8		8.5	9.5	13.5	14. 5
E2C	3	18.6	30. 8	40, 3		16. 9	18, 2	25. 9	27. 4
T2C	36	7	7	70.8		7	. 8	. 8	- '. š
TA4J	75	1.3	1.4	1.5		1.3	1.4	1.4	1.6

^{1 &}quot;Current dollar" columns express costs in constant fiscal year 1970 dollars without inflation or escalated labor costs "Escalated dollar" columns express each program manager's best estimates of costs over the total life of his particular

RUSSIAN GROUND-TO-AIR MISSILES

Chairman Stennis. Now, what is your situation here about the F-14 as against Russian ground-to-air missiles?

Admiral Connolly. Well, we are going to equip the F-14 with the [deleted].

We don't look upon the F-14 as being vulnerable to any greater degree and hopefully not as much, a lot less actually through its performance and others.

Chairman Stennis. All right; if you want to prepare a further statement on that, you can do so.

Admiral CONNOLLY. All right, sir.

(The information follows:)

The F-14s [deleted] capability [deleted] is being constantly reviewed and updated. The basic approach is to reduce costs and weight by installing only those [deleted] equipments which will do the required job. For example, we have already deleted four older pieces of equipment from the airplane because they will not meet the threat as we see it in 1975. At the same time we have been working on hardware [deleted]. Our idea is to provide the best suit of [deleted] equipments which compliment each other to enhance the F-14s capabilities in its multi-mission environment.

Other additional measures which will increase survivability over, say the F-4, are improved crew visibility to spot oncoming missiles and take immediate evasive action, a protected fuel package which will allow a damaged F-14 to return to the carrier, and armor plate in the cockpit areas for improved crew protection.

AIRCRAFT PROCUREMENT PRACTICES

Chairman Stennis. Your totals here show you are buying 24 A-4s, 12 A-6s, 12 EA-6Bs, 18 of the AV-6Bs, 30 of the A-7Es, 12 P-3Cs, 15 UH-1Ns.

Now those are very small amounts relatively and you have to pay some kind of a premium price, I am sure, to get such small amounts. And you gentlemen say you have to keep the line open, and go forth.

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program.

2 Program unit cost: R.D.T. & E. and MILCON costs added to production costs over the total life of the program.

3 Flyaway unit cost: Basic fully equipped aircraft ready for takeoff.

4 Procurement unit cost: Support costs added to flyaway costs (special support equipment, publications, contractor technical services, factory training).

5 Production unit cost: Initial spares and long lead funding added to procurement costs.

Have you ever tried to see how it would do to just close the line down for a couple of years, 3 years, and then pick up on your needs? I think you gentlemen have got to do something to make better buys and get more for your money. I didn't say buy them cheaper because they go up every year. I know you can't help that.

Admiral Connolly. We share lines in some of these airplanes with the Air Force. The UH-1N is being bought by the Air Force. I mentioned that the Canadians are going to buy it. The Huey is a long-standing helicopter for the Army. Of course, that is a smaller cost machine. The A-4 is the cheapest combat airplane we can buy.

Chairman Stennis. My question is have you ever considered trying to get at this thing on a more economical basis by closing down the line

at the time the actual facts are not as bad as their threats?

Admiral Connolly. The answer to your question is that we have let the lines go in certain categories and that is the end of it. As far as we are concerned we are not buying any more F-4's. We stopped buying CH-46's. In fact, the contractors are very worried. We are just about through with Sikorsky, the best helicopter maker in the country—I hope in the world for that matter. We are sharing the A-7 with the Air Force, so it is not an uneconomical line. The A-7—you can keep buying these at 25 a year and it is very economical. It is not uneconomical. The Marines are buying them because they are less expensive than the A-7's which I am sure the general might say we would like to have.

Chairman Stennis. I am going to stick to my question now. Have

you ever considered——

Admiral ConnoLLY. I say we have done it.

Chairman Stennis. But, you don't get back in on the buy when you do it.

Admiral Connolly. If anything happens we go back to buying some of these. If we got in an aroused situation today we would go right back to McDonnell and buy F-4's, go to Sikorsky and say start up the CH-53 line.

Chairman Stennis. You say-

Admiral Connolly. If we got in a real struggle with the Com-

munists, even if-

Chairman STENNIS. Well, I will tell you now, no use—a child would know if we got into war we would crank up a lot of these. I am talking about trying to save some money instead of keeping all these lines running all the time. Have you ever considered just let them go down and tell them that 2 or 3 years from now we may pick this back up? My question is have you ever considered doing that?

Admiral Connolly. The answer to that is yes, sir, we have. We have looked it over very carefully and Admiral Walker is here to provide more precise answers but I can tell you generally if you close a line down and they let the skills go and put the tools over to one side and then you decide to get going with that again, the costs of startup are very high. The economies available, Senator, I don't believe are real.

Chairman Stennis. So your answer is that it is not a practical way

to do it.

Admiral CONNOLLY, Senator-

Chairman Stennis. Just a minute, your answer then is that it is not a practical way to do it to have this interruption of this skill and that

you get more for your money in your opinion the way you are doing it now, is that correct?

Admiral ConnoLLY. Right.

Chairman Stennis. What did you want to say?

Admiral Walker. Senator, when you shut down a line, it has an effect on operating inventory because we produce the airplanes in orders to keep the required numbers in the operational fleet. Also, if the line is broken, costs are incurred which are considerable. This matter has been evaluated by the Air Systems Command, and we have determined that it is definitely uneconomical to break a line and then start it up again.

If we did that for the A-7, the cost would be an additional \$40

million to restart the line.

Chairman Stennis. Well, now, that is something definite that supplements Admiral Connolly's testimony. Anything else you want to

say, either one of you?

Admiral Connolly. To give you a couple of "for instances," we closed down the C-2 line at Grumman under advice from Systems Analysis in OSD in 1966 and it cost us \$6 million to start it and it started for a small number of airplanes. We did close down the A-4 line at Douglas. We did that in 1967 and then the situation changed, so we had to reopen it.

Chairman Stennis. Well, any additional illustrations you have of actual experience along that line, it would be well to give them. That is a matter that does get a little old to us on the committee even though we want you to have everything you need. It is something that is not understood by the Members of the Senate who are not on the committee, many of them, and I think you have covered it better than I have ever seen it covered.

(The information follows:)

The only other recent example of start-up costs actually incurred was \$2.9 million for starting production of the FY 1968 EA-6A program. Start-up costs for this program were minimal because major portions of the airframe common to the A-6A were already in production.

General HILL. May I say something from the Marine Corps standpoint in response to this question? For example, in this year, in the UH-1N buy, this is an attrition buy, sir. In other words, we have to have these numbers to keep an adequate force level up. So if we did this, in this particular case, and there are other cases, I think we would find ourselves probably in a couple of years at the end of the cycle we are talking about that we would be dangerously low in the number of aircraft we needed in order to meet our commitments.

Chairman Stennis. All right. Thank you very much.

MISSILE PROCUREMENT REQUEST

Chairman Stennis. I think we had better go to the next item.

Admiral Connolly. The next category, Mr. Chairman, deals with the missile procurement request. This program includes the last five Procurement of Aircraft and Missiles, Navy, budget request, five items. It provides funds for fleet ballistic missiles, navigation satellites, procurement of all guided missiles and aerial targets, whether air to ship launched, and related missile modification, spare parts and industrial facilities support.

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Again, as in the aircraft program, the funds we request for each

missile include initial spares.

That was page 24, sir. I turn to page 25. This first missile that we request is POLARIS/POSEIDON. To insure continued effectiveness of the FBM system through the 1970's and into the 1980's, a new missile, POSEIDON (C-3), was begun in fiscal year 1966. POSEIDON uses technology developed in consequence of lessons learned from Polaris operational tests and service use. It is a big step in technology now required to deal with advancing Soviet capabilities.

Our confidence in Poseidon is high because of the advanced status of the flight test program and the outstanding results to date. Sixteen POSEIDON test shots have been conducted, 11 of which were

successful.

Test results show that Poseidon will be as reliable as POLARIS. Thirty-one of the 41 existing FBM submarines will be equipped with

POSEIDON.

Fiscal year 1971 funding of \$550.5 million is requested for [deleted] POSEIDON missiles with initial spare parts and support. \$18.5 million is requested for continuing support of the POLARIS system for test equipment.

Admiral Smith is here when question times comes. He is the pro-

gram director.

Chairman STENNIS. All right.

Admiral Connolly. The next page, Mr. Chairman is 27 and it deals

with air-to-air missiles.

The first one is SPARROW. We talk about two versions of SPARROW, the AIM-7E, and the AIM-7F. The SPARROW is an all weather air-intercept missile for air-to-air combat by the F-4 and the new F-14 fighter aircraft. It is used also as a surface-to-air basic point defense missile. In air-to-air use SPARROW has accounted for [deleted] kills in Southeast Asia.

SPARROW is also used by the Air Force and by the Marines, and it is in some of our foreign areas as well. Combat in SEASIA has highlighted two prime features lacking in our air-intercept missiles:

[deleted].

The [deleted] requirement was achieved by modifying the AIM-

7E making it a 7E-2.

The modification gives both the air-to-air and surface-to-air missiles a [deleted]. Higher reliability will come with the AIM-7F, the latest SPARROW model. The AIM-7F has [deleted] capabilities than the 7E-2. [Deleted] technology has been used to obtain significant benefits in reliability.

The [deleted] missiles requested in fiscal year 1971 will replace training expenditures. They will not provide any increase in inventory. \$36.7 million is requested for [deleted] 7E-2 and [deleted] 7F SPARROW missiles. An additional \$16.0 million is requested for fleet support.

SIDEWINDER, ITS LATEST VERSION (AIM-9H)

The SIDEWINDER is a heat-seeking missile carried by fighter and attack aircraft of the Navy, Marine Corps and Air Force. It was developed by the Navy in 1955. Improvements over the years have resulted in an expanded firing envelope and higher reliability. SIDE-

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WINDER has been our most effective air-to-air missile, accounting for

[deleted] MIG kills over Southeast Asia.

AIM-9H is a solid state version of SIDEWINDER. Solid state circuitry improves missile performance in tracking a maneuvering target. It also provides significant improvement in reliability and maintainability. All serve to increase kill probability.

The quantity of 9H's requested is the lowest number necessary to replace training expenditures and does not produce a rise in inven-

tory.

\$29.1 million for [deleted] AIM-9H missiles is requested. An additional \$3.1 million is required for support and initial spares.

PHOENIX (AIM-54A)

PHOENIX missiles requested in fiscal year 1971 are for use in evaluation and verification phases that follow the research and development firings already accomplished.

This buy is also designed to insure producibility to meet inventory needs for F-14 combat readiness when the F-14 becomes operational

in the fleet.

We have completed initial PHOENIX R. & D. firings with unprecedented success. To date, we have had 20 kills out of 27 firings. SIDE-WINDER, our most reliable current air-to-air missile, was successful in 21 of its first 50 firings during this same period of R. & D. testing. PHOENIX test firings have met required contractor demonstration and feasibility tests.

It gives the fleet a far greater capability against supersonic aircraft

and missiles than we now possess and we now need.

Delay of this procurement would slip PHOENIX past F-14 intro-

duction, and would delay this important weapon capability.

[Deleted] PHOENIX missiles are requested in fiscal year 1971 at \$65.5 million. Support and spares bring to total request to \$91.6 million. With your permission, Mr. Chairman, I would like to show you a 3-minute film clip—I will perhaps do this later—which amplifies my description of PHOENIX and shows a recent actual test firing.

Chairman Stennis. All right.

Admiral Connolly. Would you care to see it now or later? Chairman STENNIS. Let us see it now.

(Film shown.)

Admiral Connolly. That happens to be the picture that we have

It is not our most impressive but it is one of the good ones.

Chairman Stennis. Well, one question while we are on this point. Do you consider this bugged out enough to go into procurement on this scale? [Deleted] missiles, \$65 million. That is a good deal of money.

Admiral Connolly. It is a terribly expensive missile, Mr. Chairman, and it is a great concern for all of us. But I feel that it is the most—it is the best missile program that we have in our country short of POLARIS.

I know you know this well but I must say that the Soviets have developed a military capability in the air, over the ocean and on land, that if you set out to cut American tactical and strategic aims, this would be the way to do it. They have built missile systems to be fired, long range, from surface ships, from submarines, from aircraft, and we have got to be able to deal with those missile system.

Chairman Stennis. I know that, but we have got to contend with some other things, Admiral. I think we are going to have to take a little more time and get the bugs out of a lot of these things and then go to production.

Now, this is rather a large bite just for missiles, [deleted] missiles, \$65 million. I believe there is something else to be added here for

ground support.

Admiral Connolly. Yes, sir. It comes to a total of \$91 million. We did do what you are suggesting last year. We did not buy any last year. We continued our test program last year with the missiles that the Congress had been—had supported the buying of in earlier years. We laid off 1 year in order to continue the development before seeking funds for more missiles. Now, these—

Chairman Stennis. The question still is are you ready? Are you

ready now to go into procurement? Are the bugs out enough?

Admiral ConnoLLY. The answer that I would give you, sir, and the

committee, is yes.

Chairman Stennis. Well, are you speaking on your own personal opinion as a professional, highly responsible military officer or are you just speaking on the general proposition of supporting what is in the budget? In other words, this may be out of your special field. I don't know. You may want someone else to give their professional opinion.

Admiral Connolly. I have the PHOENIX program manager here with me. I have the commander of the Naval Air Systems Command whose responsibility it is to bring this missile into technical readiness.

They both can respond to you, sir.

Captain Featherston, project manager for PHOENIX.

Chairman STENNIS. Captain, I know you can't be certain about these things. Let me make that clear. But to a degree you will be staking your professional reputation on these questions. You have heard my question to the Admiral. As background, are you in charge of this PHOENIX?

Captain Featherston. Yes, sir.

Chairman Stennis. Do you feel now that these tests have gotten these bugs out to the extent that we are reasonably safe in going into

production on this rather large scale?

Captain Featherston. Sir, the 1971 procurement is a pilot production request which will be the first time we buy hard tooling for the missile. This is considered very important from the standpoint of working out any production bugs. There are certain technical people who say you should go into this phase as soon as possible, as soon as the material you design is ready.

On the other hand, there is a contrary argument to continually de-

ferring pilot production.

Chairman Stennis. Well, would you have to buy this many to get

the production bugs out?

Captain Featherston. Yes, sir; and in order to build up production to meet the numbers of missiles required for test firing purposes and to build up to the inventory requirements that go with the introduction of the total weapons system. We have the firm design. We have had a successful program and the time to conduct a value engineering program on the missile, and these all lend the degree of con-

fidence we require to say that we can and should go into pilot production now to meet fleet introduction requirements, which are to have

PHOENIX equipped aircraft delivered in the spring of 1973.

Chairman Stennis. Well, I don't know how much of this money your next sentence here is mentioning the \$65.5 million support and spares, bringing the total request to \$91.6 million. Now, that is about \$26 million in round numbers additional support. What does that mean, machinery and ground support and items of that kind?

Captain Featherston. This covers several categories, Senator, including the spare parts support, the procurement of the special test sets that go with the missiles, and procurement of initial publications.

Chairman STENNIS. All right. Going back to the [deleted] PHOENIX missiles at \$65 million, is that sum for the missiles

alone or does that include machinery and other items.

Captain Featherston. That includes the procurement of the tooling necessary to build up to a [deleted] a month production rate. I should also say that our figures are budgeted at ceiling based on our analysis of contractor quotations. This budget estimate reflects an outer limit of what we would expect this missile to cost.

Chairman STENNIS. All right. Anything else you want to say,

Captain?

Captain Featherston. No, sir.

Chairman Stennis. Well, thank you very much. Do you have

someone else, Admiral, you want to say a word about.

Admiral Walker. Senator, as the Commander of the Air Systems Command, the organization responsible for aircraft and air-launched missile procurement, it is my considered opinion that we have the bugs well enough identified and worked out to go ahead with the fiscal year 1971 program.

Chairman STENNIS. All right. Well, we will get into that more

later.

All right, Admiral. Suppose you proceed with your statement. Admiral Connolly. Yes, sir. I am on page 31 and the next missile is in the air-to-surface category and it concerns SHRIKE, the AGM-45A. SHRIKE has been used in combat in SEASIA since 1965 to suppress surface-to-air missile and antiaircraft fire control radars.

We have observed that [deleted].

SHRIKE missile this year is a new version. It is designed to neutralize ground controlled intercept and early warning radars. It also has a capability against surface and air search, fire control, and missile control radars on [deleted] naval vessels.

\$11.1 million is requested for [deleted] SHRIKE missiles. \$1.5 mil-

lion of this total is for support and spares.

Admiral Connolly. The next one is CONDOR, AGM-53. Introduc-

tion of CONDOR procurement is requested.

Chairman Stennis. Yes. Excuse me a minute. Gentlemen, we propose to stay here until near 12:30 and then resume our considerations

at 2:30. All right, Admiral.

Admiral Connolly. CONDOR. The introduction of CONDOR procurement is requested. This weapon, a stand-off air-to-surface guided missile, is designed for use against heavily defended targets. Many of the most vital targets are protected by extremely heavy defenses; yet these targets must still be attacked and destroyed. This is the purpose of CONDOR. With its [deleted] accuracy from standoff range, it will destroy targets with a savings in pilots lives and aircraft. These would equate to many times more than the cost of the weapon.

Using the missile's TV display, [deleted].

The [deleted] missiles requested this year are to be used to complete operational evaluation. Cancellation of CONDOR at this point would throw away the development funds already expended and forfeit tactical test results just as the weapon becomes ready for operational use.

\$26.9 million is requested for [deleted] CONDOR missiles. \$.4 million is for initial spares and an an additional \$1.6 million is requested for fleet support.

Mr. Chairman, I believe this brief film clip will give the committee an excellent illustration of CONDOR's standoff capability and pin-

point accuracy.

It only takes a minute if we can show it to you, sir.

Chairman STENNIS. Yes. All right.

(Film shown.)

Chairman STENNIS. All right.

Continue your statement, Admiral.

Admiral Connolly. The next missile that we talk about is the surface-to-air STANDARD missile. It is called the RIM-66A. It is a surface-to-air, STANDARD missile. Medium range RIM-66A an extended range RIM-67A.

STANDARD Missile is employed in two versions that differ mainly in propulsion. The MR (medium range) will be the replacement for

TARTAR in [deleted] cruisers and [deleted] destroyers.

[Deleted] STANDARD ER (extended range) will replace the homing version of TERRIER in [deleted] frigates. Sixty percent of the components of the [deleted] mile MR are common to the ER which has a booster to go [deleted] miles.

These missiles, with new solid state electronics, take [deleted] to warm up on the launcher before being fired. They are to be used against enemy aircraft, particularly low fliers, and antiship cruise missiles. STANDARD missiles are effective also against ships.

Twenty-five ships to date have been modified for STANDARD missile. By [deleted] percent of all TERRIER and TARTAR ships will

have STANDARD missile in their batteries.

The sum of \$25.4 million is requested to fund the fiscal year 1971 production of [deleted] medium-range missiles; \$33.2 million is requested to fund the [deleted] extended-range missiles. In addition. \$12.7 million is requested to fund fleet support requirements for other surface-to-air missiles in the inventory but no longer in production.

I am ready to go to the next one. I am on page 36. This deals with the submarine-launched SUBROC, which stands for submarine

rocket.

SUBROC, a submarine-launched standoff ASW weapon, is rocket propelled and inertially guided in the air. It reenters the water and detonates as a nuclear depth bomb with a kill/damage radius far greater than conventional depth bombs.

Procurement of [deleted] missiles and funding of \$17.2 million are requested for fiscal year 1971. This includes \$0.2 million for support

and initial spares as well as \$1.6 million for long-lead items toward the fiscal year 1972 buy of [deleted] missiles. Delivery of the fiscal year 1972 buy will occur [deleted] months after the start of the fiscal year instead of the previously programed [deleted] months. By continuing the long-lead funding pattern thus established, a one-time saving of 6 months production is realized.

That leads me to the next category, sir; which is aerial targets. Continued procurement of aerial targets is requested in fiscal year

1971 at \$64.1 million.

These targets include both recoverable and nonrecoverable types and provide realistic simulation of aircraft threats. They are essential to our aircrew and shipboard training programs. These targets are used in development, testing, and evaluation of Navy missiles.

MISSILE SUPPORT

The balance of our request for missile funds includes dollars for modification of missiles now in service, spare parts to support new procurement missiles and those in the fleet, and funds for industrial facilities and the astronautics program.

The goal of the missile modification program is to improve performance, safety, reliability, and maintainability of service missiles; \$18.2 million is requested for fiscal year 1971 missile modification.

Missile spares and repair parts are required to support maintenance of missiles and outfitting of spares for new production.

A total of \$28.5 million is requested for missile spares in fiscal year

The "Missile Support Equipment and Facilities" category includes general-purpose industrial production, testing equipment, and other

facilities

The sum of \$12.5 million is requested for this missile support category, of which \$2 million is budgeted for testing and maintenance of our current inventory of navigation satellites.

MISSILE SUMMARY

This chart summarizes our total missile request by budget activity; \$975.5 million has been requested in fiscal year 1971.

PAMN SUMARY

In final summary, you see here the entire PAMN appropriation by budget activity. Total obligational authority in the amount of \$3,493,-900,000 is requested. A recoupment objective of \$50 million and other available funding of \$16.2 million results in reducing this request for new obligational authority to \$3,427,700,000.

Mr. Chairman, that concludes my prepared statement.

Chairman STENNIS. Your full statement will be placed in the record. (The statment follows:)

Mr. Chairman and members of the committee: I welcome again the opportunity to present to you the Navy's aircraft and missile procurement request. To assist me are Rear Admiral Walker, Commander Naval Air Systems Command; Brigadier General Hill, Marine Corps Deputy Chief of Staff for Air; Rear Admiral Smith, Director Strategic Systems Project Office; and Rear Admiral Wood, Commander Naval Ordnance Systems Command.

First, I will discuss the aircraft programs before proceeding with missiles. In FY 1971 we are requesting 261 aircraft—150 combat and 111 trainers. The Navy and Marine Corps' active inventory of aircraft on 1 January 1970 was 8,221, a reduction of 343 from last year. This decreasing inventory will be offset to some extent by the increased capability of our newer aircraft such as the A-7E and later by the F-14 and S-3 when they become operational in the mid-1970's. Modern weapons systems are needed to stay up with continuing Soviet advances. As an example, the Soviet Foxbat fighter shown here was first publicly demonstrated in 1967. The Yankee class nuclear submarine, similar to our Polaris FBM boats [deleted]. Our objective is to build a modern Navy, perhaps smaller in numbers, but stronger in quality and capability. We believe that we must be able to at least match the best the Soviets have to offer, particularly missiles. The next two slides are examples of their progress in this area.

The Russian cruiser shown here is carrying the Shaddock surface-to-surface guided missile. It has a much longer range than their Styx missile with which you may be familiar. This slide shows a supersonic Blinder bomber carrying the

air-to-surface Kitchen missile [deleted].

Mr. Chairman, with your permission I will review each aircraft requested this year, concentrating on how it fits our force needs. I will discuss where we stand with respect to equipping the force, why these quantities are requested and the impact on our Navy should they not be approved.

I will show a picture of the aircraft and corresponding data sheets. The data

sheets will be provided the reporter for the record.

COMBAT AIRCRAFT

A-4M

The "M" version of the Skyhawk is in its second year of production. 49 were authorized for the initial buy last year; only 41 were funded. The difference was an equal cost trade-off to provide improved configuration and more capability. The Marine Corps needs an A-4M procurement of [deleted] by fiscal year [deleted] to reach their inventory objectives which will allow them to operate [deleted] Skyhawk squadrons of A-4E's, F's, and M's in that time frame. 24 of these single place, light attack jets in fiscal year 1971 will continue the orderly introduction of A-4M's into Marine forces. Although more will be needed to complete procurement, the quantity has been held down this year to meet budget limits. A smaller procurement in fiscal year 1971 will drive unit costs up. Not gaining approval of this request will further delay badly needed modernization of the Marines' light attack inventory.

Thirty-four million one hundred thousand dollars is requested for 24 A-4M Skyhawks. In addition \$21.2 million is requested to fund initial spares and special

support required for the various 4-A sites.

I invite your attention to the Data Slide shown here. The "Characteristics" and "Manufacturers" headings are self explanatory. Under "FY 1971 Request" the dollars represent all PAMN costs broken out as indicated. I would like to emphasize that only the flyaway cost and prior year advance procurement are tied in direct proportion to this year's requested quantity. "Advance Procurement Current Year" provides long-lead funding for next year's planned request. A portion of requested support equipment and initial spares will go to outfitting support ships and air stations, independent of the quantity of aircraft in this year's buy. Other spares and support items in the aircraft request represent shortlead procurement time-phased to complete production of last year's buy. Thus, you can see that even if zero quantity of any given aircraft is to be procured this year, a portion of the initial spares and support equipment for that aircraft would still be required. These residual cost figures are available and can be furnished for the record as desired, Mr. Chairman. The "Production Unit Cost" shown here represents the total PAMN funds in FY 1971 divided by the number of aircraft. "Flyaway Unit Cost" is the cost of the completely equipped aircraft at the head of the runway ready to take-off.

Note the item "Inventory" on the left side of the Program Status Section. This figure shows the total actual inventory for this series of the model on the first of the calendar year. The title "Funded and Undelivered" pertains to the airplanes in this series approved by Congress for procurement but not delivered to the Navy by 1 January. "Costs Through Budget Year" indicates total accumulated PAMN costs of the program through this year's request. On the right side of the "Program Status" section you will note the heading "Total PAMN Program". Items under this heading refer to total programmed procurement for all years.

Details on procurement quantities programmed for the out years including inventory objectives, RDT&E and MILCON, and total program costs are available

for each item on a second data slide, if you desire to see them.

Please note that the total costs I am showing you are in current (FY 1970) dollars. Perhaps you have seen other sources which project these costs in escalated dollars—certain of the Selected Acquisition Reports for instance. There are good reasons to support both methods of presentation. My purpose in presenting current dollars is to provide a constant base for comparison of all the PAMN total programs. Some programs reach their inventory objectives in the next year or two, others extend on considerably longer. We cannot know precisely how the economic trends will influence costs over those periods. We certainly hope and expect that inflationary factors will have been checked. We feel that the use of today's dollars at this time will give you the clearest picture of the scope of the various programs as we see them today.

A-6E

The Λ -6 two-place medium-attack jet made a combat reputation for night and all-weather attack under most stringent conditions in Vietnam. It has successfully completed strikes in a hostile environment under weather conditions well beyond the capabilities of any other aircraft in the U.S. inventory. The Λ -6 has an incredible carrier landing safety record since it came to the fleet, which now spans over 45,000 arrested landings without an accident. We expect the Intruder to remain the bulwark of Navy all-weather attack capability for many more years. Better reliability and performance to span the period ahead have been incorporated in the "E" series of the Λ -6 in the form of improved radars, digital computers, instrumentation and weapons release systems.

We plan to be operating [deleted] squadrons of Intruders—[deleted] Navy and [deleted] Marine Corps—by FY [deleted]. Other priorities in the budget permit us to request only 12 A-6's this year. This buy does not permit any meaningful progress toward the A-6 inventory objectives. It does provide production continuity, a very important factor in view of FY 1970 cancellation of new KA-6

tanker production.

These valuable and versatile aircraft are badly needed; we are requesting \$64.4 million for 12 Intruders. Support and training equipment along with advance procurement funding bring the total request to \$137.7 million.

EA-6B

This four-place electronics warfare version of the Intruder, specifically designed for tactical jamming, has undergone an evolution of improvements in capability [deleted]. Using a [deleted] system to [deleted] automatically train [deleted] jammers, it radiates [deleted] more power than any other airborne jamming system in the U.S. inventory. This aircraft accompanying strike aircraft to the target areas will heavily degrade, if not nullify, radar and communications equipments of enemy air and surface defense systems. We expect large pay-offs in terms of fewer aircraft and pilot losses and greater effectiveness of our striking aircraft.

The Navy's tactical electronics warfare aircraft, for the most part, are conversions of older planes and unable to accompany strike aircraft into hostile areas. The jammers are [deleted]. The EA-6B is a major and most significant step forward. Pilots with combat experience over North Vietnam will vouch for the necessity of the protection offered by this type of airplane. We plan to replace the old electronic warfare aircraft with the EA-6B as rapidly as funds will let us

The versatile EA-6B has completed extensive engineering testing and has made over 400 flights [deleted]. \$115.9 million is requested for 8 EA-6B's with associated initial spares, support and long lead funding amounting to a total request of \$188.0 million.

A V-6B Harrier (Now redesignated A-8A)

This tactical V/STOL aircraft has been operational with the Royal Air Force since the spring of 1969. Experience with it to date has been very good and they plan to deploy a squadron [deleted]. Three Marine pilots are flying with British squadrons to gain Harrier V/STOL experience. Acquisition of this promising aircraft by the Marines provides a real increase in deployment flexibility and rapid reaction to calls for close air support during assault operations.

A licensing agreement has been reached which covers a phased plan to shift complete manufacture and assembly of the Harrier to the U.S. Know-how and

technology are being acquired. The FY-1970 procurement is providing for elimination of dependence on U.K. experts for technical and engineering support of the airframe and avionics. This has not been accomplished for nothing, however, as tooling, engineering and associated costs have raised required funding. We believe it is still a good investment and is an opportunity not otherwise available for Naval Aviation to take a successful early step forward in V/STOL operations. It also provides the opportunity for American industry to gain experience and expertise in this new field.

[Deleted.] With attrition, pipeline and training requirements a total program

procurement of [deleted] Harriers is necessary.

We are requesting \$76.0 million this year to procure 18 Harriers. This will round-out the first operational squadron started last year and provide the required training nucleus. \$42.3 million is also needed for special support and training equipment, initial spares and long-lead funding.

A-7E

The Corsair II has earned an excellent name in combat in Southeast Asia. During recent carrier trials, an A-7E with the new TF-41 engine was launched with the heaviest external ordnance load ever catapulted from a carrier deck on a single engine aircraft—[deleted] pounds. Besides a heavier payload, this new 15.000 pound thrust engine provides considerably more combat maneuverability, particularly in getting into and away from heavily defended target areas. Much higher bombing accuracy with the A-7E shown only by test flights this time last year, has now been achieved on a wide scale by pilots in operational squadrons. The A-7E will deploy in April [deleted].

The Navy's plan is to be operating [deleted] squadrons of A-7s by [deleted] of these squadrons will be flying the "E" version. This will require a procurement of [deleted] A-7Es, of which [deleted] are currently funded or delivered. 30 aircraft in FY 1971 provide attrition replacement and do not raise the over-

all A-7 inventory.

\$72.8 million is requested for 30 A-7Es, along with initial spares and support

for a total program of \$133.0 million.

The first F-14A aircraft is beginning to take shape. We continue to keep a tight watch on weight and performance milestones as well as cost. The current empty weight is within one per cent of that specified. Refined design of components is expected to insure a take-off combat weight of 53,500 pounds in the air superiority fighter role. The TF-30-P-412 engine has already run in a full size F-14 inlet without problems. Complete weapons system integration and testing were underway in January using the System Integration Test Station at Point Mugu. Other systems—fuel, wing sweep, landing gear, flaps and slats—will have been tested with actual components prior to installation and first flight, which is now less than a year away.

We are requesting 26 aircraft in FY 1971 which will allow us to proceed with a carefully planned test and evaluation program, features of which have included many engineering milestones, 25,000 hours of wind tunnel testing plus an independent evaluation by NASA in 1969. The first eight aircraft of this buy will be used initially for Board of Inspection and Survey trials and for Fleet Operational and Technical Evaluation. The remaining eighteen will go to the first fleet training squadron. I would like to emphasize that the first 18 F-14's will be produced [deleted] commencing in January 1971. This will provide [deleted] months of flight testing before the production rate is raised

to [deleted] aircraft per month.

Competition between Pratt & Whitney and General Electric for development and production of the advanced technology engine was just completed in February of this year. Pratt and Whitney was selected as the winner. The Navy and Air Force are working together on this engine. The Navy version is programmed to go into production aircraft with the number 68 F-14 in FY 1972. Initial Operational Capability (IOC) will follow in December 1973. The Air Force version will go into their F-15. The engine is on schedule with both Navy and Air Force versions meeting initial test stand requirements. This slide shows the engine operating in afterburner. The Navy version has also been run with the full scale F-14 inlet.

Soviet accomplishments in fighter technology indicate clearly that we should not delay the early 1973 IOC date of the F-14. Present Navy plans call for [deleted] Navy and [deleted] Marine squadrons of F-14's to be in fleet operation by FY 1980. When pipeline, replacement, and training requirements are added,

a total PAMN procurement of 710 aircraft results. 6 of the RDT&E aircraft

will also be returned to operational use.

\$389.4 million is requested for 26 F-14A's. Special support and training equipment for the various sites along with initial outfitting spares and long lead funding make up the total request of \$658.0 million.

UH-1N

The UH-1N Iroquois is the latest model of the famous "Huey" helicopter, incorporating design and equipment improvements. Foremost is the new twin turbine engine configuration which markedly improve reliability, safety, and military effectiveness. The Navy, Marines and Air Force will use this aircraft in similar configurations. The Canadian Defense Ministry also has ordered [deleted] UH-1Ns with options for [deleted] more for their armed services.

The 15 aircraft in this year's request replace Marine UH-1E losses. They will be employed by the Marine Corps in utility missions such as medical evacuation, support for ground reconnaissance patrols and command and control. A secondary mission will be all weather movement of troops, equipment and

cargo during amphibious assault and follow-on operations ashore.

The Marine Corps has reduced forces by [deleted] in FY 1971 to retain UH-1 light helicopter squadrons in the permanent force structure. A continuing program provides for the eventual operation of [deleted] of these squadrons by FY [deleted]. Two Navy squadrons will operate these aircraft in the same time frame for at-sea logistics on non-aviation ships. A larger FY 1971 buy would provide a lower unit cost, but funds for a larger procurement this year are simply not available.

\$11.0 million is requested for 15 UH-1N's. An additional \$10.2 million is requested for support, advance procurement and initial spares.

P-30

The third and latest version of the Orion has only recently been introduced in our fleet ASW squadrons. Its superior capabilities have generated much enthusiasm on the parts of pilots and fleet commanders. The major increase in effectiveness comes from new ASW avionics that utilize computerized displays of collected sensor intelligence. Sensors are passive and active acoustics, radar, electronics countermeasures receivers, magnetic detection and low light level television. Navigation and communications equipments have been updated to be compatible with our latest systems.

Approved forces include [deleted] P-3 squadrons which will be composed of [deleted] P-3C and [deleted] P-3B squadrons by [deleted]. The quantity of 12 aircraft this year represents a bare minimum to sustain the production base while making some advancement toward inventory objective. It is essential that we continue to modernize our ASW force commensurate with the increasing tech-

nological advancements in Soviet submarines.

\$115.0 million is requested for 12 P-3's; with initial spares, support and long lead procurement for next year bringing the total request to \$168.5 million.

8-34

The S-3A, in PAMN for the first time this year, is a completely new aircraft planned for delivery to the Fleet in [deleted]. It is being designed as a carrier based system to meet the Soviet threat posed by [deleted] nuclear submarines in the 1975-85 time frame. Design of the system is a culmination of eight years of study and development and will represent a major advancement in antisubmarine warfare technology.

The aircraft design is straightforward, one that will be powered by two newly developed TF-34 turbofan engines. These engines are being developed for this aircraft and will enable it to operate efficiently from sea level to [deleted] feet.

The fuel system is optimized for carrier operations and support.

The avionics of the S-3A are oriented to a general purpose digital computer. Sensor output is fed to the computer for solution, storage and display as desired. The system uses sensor information much more effectively, enabling the crew of four to function as well as a much larger crew using the older equipments.

The S-3A is being designed to use [deleted] homing torpedoes, and mines as well as conventional and nuclear depth charges. It will provide effective antisubmarine coverage without reliance on land bases. While it replaces the S-2E now in service, the S-3A will be, conservatively [deleted] times as effective against submarines, and will constitute a completely new concept of carrier-based anti-submarine warfare. Its range, speed and flexibility will enable sea-

based air power to meet a wide spectrum of threat. An estimated procurement of 193 will be required to reach a planned operating force of [deleted] anti-submarine air groups by FY [deleted]. Delay in introduction of this aircraft will result in a most serious degradation in our readiness to cope with the Soviet submarine threat.

\$48.1 million is requested for the initial production procurement of 2S-3A's. We also seek \$30.9 million for special support equipment and \$22.7 million advance

procurement to fund long lead items.

E-2C

FY-71 marks the first PAMN request for the E-2C Hawkeye which is now in its fourth year of development. It is scheduled for delivery in [deleted] and to go to the fieet in [deleted] when it will replace old E-1Bs. The aging AEW aircraft with airframes 11 years and older no longer meet today's AEW needs; not alone because of age but for serious equipment limitations as well.

Significant improvement in performance encompassed in the new E-2C is badly needed to modernize our airborne early warning and strike control capability. Without the E-2C, by FY [deleted] the Navy-would have sufficient E-2As remaining to support only seven air wings. Planned procurement of [deleted] E-2Cs through FY [deleted] will meet the force requirement. The procurement requested this year starts up the production line.

\$55.8 million is requested for the initial three E-2Cs. \$45.0 million is requested for site support and initial outfitting of spares. An additional \$20.0 million is

requested to fund long lead items for follow-on buy.

TRAINER AIRCRAFT

The Trainer category has two principal models in FY 1971 procurement—the T-2C Buckeye and TA-4J Skyhawk.

T-2C

The T-2C is a twin jet, tandem trainer designed for basic jet training. Fully carrier suitable, the Buckeye provides initial weapons training and qualification aboard the aircraft carrier. There is a very urgent need for these aircraft to sustain the basic jet trainer inventory. Older T-2A's are all operating on service life extensions; due to their age and material condition they should be replaced. It is desirable to replace the T-2A's rapidly but other needs limit this year's request to 36 T-2C's. If this procurement were deferred it would be necessary to extend the T-2A's more and to accept lessened safety, flexibility and efficiency.

An all-jet basic training syllabus will require [deleted] T-2's in the late 1970's. With pipeline and attrition this means a total procurement of [deleted] air-

craft through FY [deleted].

\$27.6 million is requested this year for 36 T-2C's. This includes funds of \$1.7 million for support and spares.

TA-4J

The TA-4J is a two sea high performance advanced jet trainer. It is replacing our obsolete F-9 trainers which range from 13 to 18 years old, many years past their cost-effective service life. The TA-4J is fully suitable for weapons training and carrier work. Its performance will meet Navy advanced flight training requirements for many years.

The quantity requested this year constitutes an increment of phased procurement toward a Navy objective of an all-jet advanced training syllabus ultimately operating [deleted] Skyhawk trainers. Pipeline and attrition are estimated to make necessary a total buy of [deleted] aircraft through FY [deleted].

\$95.3 million is requested for procurement of 75 TA-4J's. Support and training equipment, initial spares and long-lead funding amount to an additional \$12.1 million.

AIRCRAFT MODIFICATION

The Aircraft Modification Program corrects deficiencies and provides improvements in the aircraft now in the operating inventory. The \$255.9 million requested in FY 1971 is \$60 million less than last year and has funds for the following purposes:

\$103.9 million for Safety of Flight. Examples: Installation of Automatic Carrier Landing System (ACLS) capabilities in several aircraft types and continued back-fitting of "Zero/Zero" ejection seats. These safety improvements are designed

to decrease accident risk and to correct deficiencies existing in the inventory.

They pay for themselves in lives and aircraft saved.

\$25.5 million for improvement in combat capability and survivability. Examples: Electronic warning and countermeasure devices for our fighter and attack aircraft; and improvements in missile control and weapons delivery accuracy. These items will increase combat effectiveness and our ability to penetrate high threat areas.

\$103.4 million for operational improvements. Examples: Installation of the DIFAR sonobuoy equipment in P-3 and S-2 aircraft, and improved IFF and

altitude reporting equipments to meet FAA safety requirements. \$5.5 million for service life extension. The phased program this year continues with increments of the C-130 and A-3 series of aircraft. The service life extension program is a continuation of prior year programs that aim at modernizing older aircraft to attain additional useful service.

\$17.6 million for converting 20 older A-6As to KA-6D tanker aircraft. You may recall that the Congress removed funds for new KA-6D procurement last year and provided instead for the conversion of 16 A-6As to tankers. This request continues that program to meet Navy tanker requirements and is in consonance with Congressional desires last year.

AIRCRAFT SPARES

The FY 1971 budget requests \$447.4 million for aicraft spare parts and components. Of this total you have already seen \$234.8 million shown separately on the aircraft data slides as initial spares associated with current aircraft series. In adjusting to a tighter budget we have trimmed our spares request \$120 million from last year's request. The funds in this budget are essential to over-

come spares deficits and provide adequate support.

Spares requirements are directly related to operations as well as to numbers and types of aircraft. Reductions in spares funding, while continuing at a given rate of aircraft procurement and operations, always result in serious support problems. For example, spares funding deficiencies in every year since FY 1967 have brought about disruptions in rework and maintenance and have lowered the availability of mission ready aircraft. The average daily number of aircraft not fully equipped or grounded for parts has almost tripled in the past five years and is now 20% of the operating aircraft inventory. Adequate spares support is essential if aircraft are to be used efficiently and effectively.

Although PAMN spares are funded for budget purposes as a single line item under one budget activity, they actually fall into two categories—initial and replenishment. Initial spares are an outfitting investment and can be repaired and reused. They are provided to the operating bases, carriers and other sites which will be supporting new or modified aircraft entering the inventory. Also included in the initial spares category is \$55.6 million to fund spares that support our air-

craft modification program.

The second spares category is replenishment spares. This procurement is necessary to replace initial and modification spares which are worn out or unrepairable. It provides also for increases in demand for repairable items as a result of updated usage information or higher operating tempos.

In summary the request this year seeks \$299.4 million for initial spares and

\$148.0 million for replenishment spares.

AIRCRAFT SUPPORT EQUIPMENT AND FACILITIES

Four categories in this budget activity support the aircraft procurement program. \$212.3 million in the FY 1971 request fund these categories:

\$43.1 million for Component Improvement. This provides continuing engineering effort to improve aircraft engines. The project also funds improvements in

starters and electrical power systems.

\$27.9 million for Aircraft Industrial Facilities. This category finances the replacement and restoration of government owned machine tools, capital maintenance, and new production equipment necessary for economical and efficient production and rework of aircraft procured under this appropriation. This request does not provide "brick and motar" facilities.

\$96.3 million for Common Ground Equipment. This support program is new to PAMN and was formerly funded in the OPN appropriation. It provides funds for the Versatile Avionics Shop Test (VAST) system, aircraft systems trainers, training aids and devices. It provides maintenance equipment for aircraft elec-

trical systems and other common ground support equipment.

\$45.0 million for Other Production Charges. This category provides peculiar support equipment for out-of-production aircraft, funds for aircraft cameras, modification of weapons system trainers, and other production costs not identifiable with any one specific aircraft model.

MISSILE PROGRAM

Mr. Chairman, I will now review the Missile Procurement Request.

This program includes the last 5 of the 12 PAMN budget activities; it provides funds for Fleet Ballistic Missiles, Navigation Satellites, the procurement of all guided missiles and aerial targets—air and ship-launched; and related missile modification, spare parts, and industrial facilities support, Air-launched missiles and aerial targets used by the Marine Corps are also in this program.

Again, as in the aircraft programs, the funds we request for each missile

include initial spares.

BALLISTIC MISSILES

POLARIS/POSEIDON

To insure continued effectiveness of the FBM system through the 1970s and into the 1980s, a new missile, POSEIDON (C-3), was begun in FY 1966. POSEIDON uses technology developed in consequence of lessons learned from POLARIS operational tests and service use. It represents a big step in technology now required to deal with advancing Soviet capabilities.

The POSEIDON warhead is a Multiple Independently Targetable Re-entry Vehicle (MIRV) that will maintain the deterrent value of the FBM System.

Our confidence in POSEIDON is high because of the advanced status of the flight test program and the outstanding results to date. Sixteen POSEIDON test shots have been conducted, eleven of which were successful. The first flight demonstrated the MIRV system and provided confidence in the design of POSEIDON. The fourteenth flight, successfully conducted from the USS Observation Island, was the first shipboard test of the operational configuration of the combined fire control, launcher and missile subsystems.

Test results show that POSEIDON will be as reliable as POLARIS. Besides, its greater employment flexibility and wider target area coverage will reduce

our dependence on precise intelligence projections.

31 of the 41 existing FBM submarines will be equipped with POSEIDON. First delivery of tactical POSEIDON missiles is planned for [deleted] initial

deployment in January 1971.

FY 1971 funding of \$550.5 million is requested for [deleted] POSEIDON missiles with initial spare parts and support. \$18.5 million is requested for continuing support of the POLARIS systems for test equipment, surveillance components and operational engineering support.

OTHER MISSILES

Air-to-air

SPARROW III (AIM-7E/7F)

SPARROW is an all-weather air-intercept missile for air-to-air combat by the F-4 and the new F-14 fighter aircraft. It is used also as a surface-to-air Basic Point Defense Missile. In air-to-air use Sparrow has accounted for [deleted] kills in SEASIA.

Combat in SEASIA has highlighted two prime features lacking in our air-

intercept missiles: [Deleted].

The [deleted] requirement was achieved by modifying the AIM-7E making it a 7E-2. Modification of the 7E inventory is underway and all new production 7E missiles will have the -2 improvement. The modification gives both the airto-air and surface-to-air missiles a [deleted]. Higher reliability will come with the AIM-7F, the latest SPARROW model. The 7F has [deleted] capabilities than the 7E-2. [Deleted] technology is used to obtain significant benefits in reliability. For example, the 7F can be catapulted and arrested [deleted] times on our fighters without having to be off-loaded for bench checking. The 7E-2 must be checked after [deleted] flights. Increased performance and reliability will give the 7F a kill probability of [deleted] in comparison to [deleted] for the 7E-2.

The [deleted] missiles requested in FY-71 will replace training expenditures. They will not provide any increase in inventory. \$36.7 million is requested for [deleted] 7E-2 and [deleted] 7F SPARROW missiles. An additional \$16.0 million

is requested for fleet support.

SIDEWINDER (AIM-9H)

The SIDEWINDER is a heat-seeking missile carried by fighter and attack aircraft of the Navy, Marine Corps and Air Force. It was developed by the Navy in 1955. Improvements over the years have resulted in an expanded firing envelope and higher reliability. SIDEWINDER has been our most effective air-to-air mis-

sile, accounting for [deleted] MIG kills over Southeast Asia.

AIM-9H is the solid state version of SIDEWINDER. Solid state circuitry improves missile performance in tracking a maneuvering target. It also provides significant improvement in reliability and maintainability. All serve to increase kill probability. Cost of the AIM-9H is comparable to that of the 9G, a [deleted] version. Through reduced rework and repair needs, dollar savings over the years are expected. The quantity of 9H's requested is the lowest number necessary to replace training expenditures and does not produce a rise in inventory.

\$29.1 million for [deleted] AIM-9H missiles is requested. An additional \$3.1

million is needed for support and initial spares.

PHOENIX (AIM-54A)

PHOENIX missiles requested in FY 1971 are for use in evaluation and varification phases that follow the research and development firings already accomplished. [Deleted] missiles are planned for contractor demonstration; [deleted] for Navy technical evaluation [deleted] for ground tests and reliability, etc.; [deleted] for Board of Inspection and Survey Trials; and [deleted] missiles for fleet operational introduction. This buy is also designed to insure producibility to meet inventory needs for F-14 combat readiness when the F-14 becomes operational in the fleet.

The AWG-9 Weapons Control System is an integral part of the F-14/PHOE-NIX programs. A pre-production version of the AWG-9, installed in a test bed aircraft, will fly in [deleted]. This gives us a headstart in maintainability, relia-

bility, and system integration.

We have completed initial PHOENIX R&D firings with unprecedented success. To date, we have had 20 kills out of 27 firings. Sidewinder, our most reliable current air-to-air missile, was successful in 21 of its first 50 firings during test phase. PHOENIX test firings have met required contractor demonstration and feasibility tests. Also, and equally important, the test firings have disclosed a wealth of information on advanced operational uses of the missile. PHOENIX is a long-range weapon that can be fired in rapid succession against a wide spectrum of targets at all F-14 speeds and altitudes. It gives the fleet a far greater capability against supersonic aircraft and missiles than we now possess.

Delay of this procurement would slip PHOENIX past F-14 introduction, and

would delay this important weapon capability.
[Deleted] PHOENIX missiles are requested in FY 1971 at \$65.5 million. Support and spares bring the total request to \$91.6 million. With your permission. Mr. Chairman, I would like to show you a 3 minute film clip which amplifies my description of PHOENIX and shows a recent actual test firing.

Air-to-surface

SHRIKE (AGM-45A)

SHRIKE has been used in combat in SEASIA since 1965 to suppress surfaceto-air missile and anti-aircraft fire control radars. It is on all CVAs and can be fired from A-4, A-6 and A-7 aircraft. Much has been asked and answered on the effectiveness of SHRIKE. We know that it destroys radars [deleted] because we have observed many non-combat firings. We have observed that

SHRIKE missile this year is a new version. It is designed to neutralize ground controlled intercept and early warning radars. It also has a capability against surface and air search, fire control, and missile control radars on [deleted]

naval vessels.

\$11.1 million is requested for [deleted] SHRIKE missiles. \$1.5 million of this total is for support and spares.

CONDOR (AGM-53)

Introduction of CONDOR procurement is requested. This weapon, a standoff air-to-surface guided missile is designed for use against heavily defended targets. It is the only tactical standoff missile under development by the United States. The requirement for stand-off capability is based on the strength of the enemy's anti-air defense. Many of the most vital targets are protected by extremely heavy defenses; yet these targets must still be attacked and destroyed.

This is the purpose of CONDOR. With its [deleted] accuracy from stand-off range, it will destroy targets with a savings in pilots lives and aircraft many times more than the cost of the weapon.

CONDOR uses a television camera that views the area ahead of the missile.

The TV camera and missile [deleted].

The principal difficulty with CONDOR has been propulsion, but this appears to have been solved with the shift from a liquid to a solid motor. Fourteen have been fired—one airborne. All milestones of the current program have been met on or ahead of schedule. One potential variation for this weapon in the future is to increase warhead size from [deleted] to [deleted] pounds, with proportional [deleted].

The [deleted] missiles requested this year are to be used to complete operational evaluation. Cancellation of CONDOR at this point would throw away most of the development funds already expended and forfeit tactical test results just as the weapon becomes ready for operational use.

\$26.9 million is requested for [deleted] CONDOR missiles. \$.4 million is for

initial spares and an additional \$1.6 million is required for fleet support.

Mr. Chairman, I believe this brief film clip will give the committee and excellent illustration of CONDOR's stand-off capability and pinpoint accuracy.

Surface-to-air

STANDARD Missile.—(Medium Range (RIM-66A) and Extended Range (RIM-67A)).

STANDARD Missile is employed in two versions that differ mainly in propulsion. The MR (medium range) will be the replacement for TARTAR in [deleted] cruisers and [deleted] destroyers. STANDARD MR uses (deleted) STANDARD ER (extended range) will replace the homing version of TERRIER in [deleted] frigates. Sixty percent of the components of the [deleted] mile MR are common to the ER which has a booster to go [deleted] miles.

These missiles with new solid state electronics take [deleted] to warm up on the launcher before being fired. They are to be used against enemy aircraft, particularly low fiers, and anti-ship cruise missiles. STANDARD missiles are

effective also against ships.

The operational/technical evaluation of STANDARD Missile was completed in 1969. Preleminary data show that STANDARD Missile performance will exceed contract specifications. Improved tactical effectiveness provides multiple target discrimination and better electronic countermeasures. Production improvements have eliminated the need for shipboard testing.

Twenty-five ships to date have been modified for STANDARD Missile. By [deleted] percent of all TERRIER and TARTAR ships will have STANDARD Missile in their batteries. They will still continue to expend TERRIER and

TARTAR, however, until the inventory is used.

FY-71 procurement provides funding for the fifth year of a six-year fixed-price contract. Changes at this time would result in renegotiation and put agreed costs

and schedules in jeopardy.

\$25.4 million is requested to fund the FY 1971 production of [deleted] medium range missiles. \$33.2 million is requested to fund the [deleted] extended range missiles. In addition, \$12.7 million is requested to fund fleet support requirements for other surface-to-air missiles in the inventory but no longer in production.

Submarine launched

SUBROC (UUM-44A-2).— SUBROC, a submarine-launched stand-off ASW weapon, is rocket propelled and inertially guided in the air. It reenters the water and detonates as a nuclear depth bomb with a kill/damage radius far greater than conventional depth bombs.

SUBROC is the only quick-reaction ASW weapon for U.S. submarines. It is being produced at minimal economic sustaining rate to meet war and training

requirements through FY 1978.

Procurement of 30 missiles and funding of \$17.2 million are requested for FY 1971. This includes \$.2 million for support and initial spares as well as \$1.6 million for long lead items toward the FY 1972 buy of [deleted] missiles. Delivery of the FY 1972 buy will occur [deleted] months after the start of the fiscal year instead of the previously programed [deleted] months. By continuing the long lead funding pattern thus established, a one-time saving of six months production is realized.

AERIAL TARGETS

Continued procurement of aerial targets is requested in FY 1971 at \$64.1 million.

These targets include both recoverable and non-recoverable types and provide realistic simulation of aircraft threats. They are essential to our air crew and shipboard training programs. These targets are used in development, testing, and evaluation of Navy missiles.

Four targets account for the bulk of the request. The subsonic BQM-34A and the supersonic BQM-34E and AQM-37A simulate aircraft for air-to-air and surface-to-air missile training and evaluation. Subsonic, recoverable MQM-74A

drones are used in anti-air gunnery exercises.

The remainder of the request seeks funds to convert older aircraft to drones, to support drones used in missile evaluation and to fund tow targets used in training.

MISSILE SUPPORT

The balance of our request for missile funds includes dollars for modification of missiles in service, spare parts to support new procurement missiles and those in the fleet, and funds for industrial facilities and the astronautics program.

The goal of the Missile Modification program is to improve performance, safety, reliability and maintainability of service missiles. \$18.2 million is requested for

FY 1971 missile modification.

Missile Spares and Repair Parts are required to support maintenance of missiles and outfitting of spares for new production. The initial spares portion of this request totals \$22.8 million. You have seen a part of these funds already. They were carried separately in the data slide for each missile that I discussed earlier in this statement. Also required is \$5.7 million for replenishment spares to support missiles already in the fleet. A total of \$28.5 million is requested for Missile Spares in FY 1971.

The Missile Support Equipment and Facilities category includes general purpose industrial production, testing equipment and other facilities. Other funds are required for the restoration and replacement of government owned machine tools, capital maintenance, and for improvements in production and test facilities. \$12.5 million is requested for this missile support category, of which \$2.0 million is budgeted for testing and maintenance of our current inventory of navigation satellites.

MISSILE SUMMARY

This chart summarizes our total missile request by budget activity. \$975.5 million is requested in FY 1971.

PAMN SUMMARY

In final summary, you see here the entire PAMN appropriation by budget activity. Total Obligational Authority in the amount of \$3 billion 493.9 million is requested. A recoupment objective of \$50 million and other available funding of \$16.2 million result in adjusted New Obligational Authority of \$3 billion 427.7 million. Re-appropriation of \$43.0 million of previously appropriated funds is also requested in accordance with Section 642 of the FY 1970 Department of Defense Appropriation Act. This will result in Final New Obligational Authority of \$3 billion 470.7 million.

SUBMARINE CONVERSION REQUEST

Chairman STENNIS. All right. The Appropriations Committee last year slowed down the modification of the POLARIS submarines, moving on into the POSEIDON. Now, did you give a corresponding slowdown in your request for 1971 that conforms to that slowdown required by the Appropriations Committee?

Admiral CONNOLLY. Senator Stennis, Rear Admiral Smith is the

real expert here. May I call on him?

Admiral SMITH. Yes, sir.

Chairman Stennis. All right. You heard the question. You may answer, Admiral.

Admiral Smith. The number of missiles requested in this budget is completely consistent with the conversion authorizations that were funded in fiscal year 1970 and requested in the fiscal year 1971 conversion.

Chairman Stennis. So your request this year for the missiles conforms to the slowdown formula carried in the fiscal 1970 appropri-

ations.

Admiral SMITH. Yes, sir, it does.

Chairman Stennis. And, of course, it also conforms to what you expect to receive in the 1971 budget.

Admiral Smrrn. What we have requested in 1971 budget, yes, sir.

MISSILE DEVELOPMENT

Chairman STENNIS. Gentlemen, about these missiles now, I raise a question here about production to this extent, at least. As I understand it, you want to get into procurement partly for further tests. It seems to me you ought to keep these accounts in the research and development category until you are really ready for production of

a proven weapon.

Now, Mr. Packard said fly before we buy. That is a pretty phrase but if we don't live up to it, we just are continuing on like we have been doing, getting into these rather large scale productions before you ever get the matter tested out. I think, and I know you are very sincere in your request here, these matters are also still in research and development. You are asking for funds, say, for PHOENIX and CONDOR in the research and development budget, too, aren't you!

Admiral Connolly. Yes, sir. Mr. Chairman, we have a sort of a

mixture here. We agree with your point completely.

Chairman STENNIS. Have you been before the McIntyre subcommittee on these matters?

Admiral Connolly. No, sir, I have not. We have so far been to

you, sir, and to Chairman Rivers.

Chairman Stennis. Well, since you have got to justify the research and development for Senator McIntyre's subcommittee, we might ask them to also take up with you this procurement and that you present all of it together. It is rather hard anyway for you to have to be presenting it piecemeal, first, your research and development, and then

the early stages of your proposed procurement.

Admiral Connolly. May I make a response? I think that we would very much like to put our CONDOR request in the R. & D. category, withdraw it out of the procurement category and put it in the R. & D. category. We are going to make some modifications. We are working with one of Dr. Foster's principles and Admiral Walker and I are prepared, Dr. Frosch also, to come in with a revision which will lower the cost and will achieve our objectives and we would like to carry this in the R. & D. category. I am speaking to CONDOR. We don't want the committee or anybody else to get the idea that we are going to come up positively next year and say I am all set for millions of production because we are going to verify that we really have not only a workable weapon but a weapon which must be—which we must have in light of all the other requirements that we face.

So what I mean by this remark is that we are going to really decide this coming year on the basis of technical evaluation and operational

tests just what to do with CONDOR.

Not that we are in doubt as to it being a good weapon but as you suggest, we have to relate it to other things we also need. So if I may, I would dispose of CONDOR by saying we would like to come back and put it in the R. & D. category.

With respect to PHOENIX

Chairman Stennis. You are going to request the same amount of

money in the R. & D. as you have in here?

Admiral Connolly. No. We are going to put about a total of about 27 or 28 million of R. & D. with no PAMN, procurement aircraft missile, Navy.

Chairman Stennis. Yes. You will do that, then, officially when you

meet with the McIntyre subcommittee, correct?

Admiral ConnoLLY. We will have that in line before we go there. We have it now essentially in mind. We have been working with the contractor and Naval Air Systems Command.

Chairman STENNIS. The request is that you give something offi-

cially there so we can change the bill.

Admiral ConnoLLY. The main thing we want is authorization to buy the [deleted] weapons. You see, the reason that the cost is 28.9 in the procurement account and about \$23 million in R. & D. was that we were going to build the tooling. Once you build the tooling, this is where you go over into the procurement account. So far we haven't bought tooling in R. & D. We are not going to buy tooling, Mr. Chairman, so we will fall back into an R. & D. category for this weapon. Chairman Stennis. Well, this memorandum I have here on the

CONDOR has this line. "Percent of funds to completion, 28 percent." So you really are not moneywise a third finished with reference to your R. & D. program. Just 28 percent according to this memo. Well,

vou-

Admiral Connolly. I think that memo is in error, Mr. Chairman. Chairman Stennis. All right. You can give us the correct figure, then, at this point in the record.

(The information follows:)

Total CONDOR RDT&E funding as stated in the currently approved Developmental Concept Paper is \$151.4M. A total of \$123.8M RDT&E funds (82 percent) will have been expended through fiscal year 1970.

Chairman Stennis. All right. You are going to transfer that over to

the R. & D. account. Now, you want to say something further.

Admiral Connolly. I do want to say something about PHOENIX. We put it in the procurement account because there comes a time, and we believe that time is now, when we should start to make these missiles with tooling. It is a fly before buy situation, Mr. Chairman. I am glad you brought that point up because each one of these missiles is going to fly. That is the one difference that is very clear in the missile business, that you buy them and fly them, and you do know that we are going to work. It is not like asking to go into production in an aircraft before you fly. In the case of the missiles we fly them.

Now, we will go back and take another look and get together with your staff if you would like that in trying to come up with a rationalization which will be clearer to you and to the committee. But we do feel that now is definitely the time to start building the missile, PHOENIX missile, with regular tooling. You have to cross that bridge at some point in time. You can't stall it forever and the longer you stall it the more the total program costs because you pay for the so-called soft tool manufacturing and then you eventually go to hard tooling and you have the added cost. So there is some economy in going to harder tooling.

Chairman Stennis. All right. Well, there will be questions this afternoon, Admiral, on these points. Do you want to say a word,

though, about the PHOENIX?

Admiral ConnoLLY. I am all through.

Chairman Stennis. All right. We would like to hear the presentation on tracked vehicles now. We will resume our sitting, gentlemen, at 2:30. We do have another matter but we will be glad to have you here and be ready to resume with you as soon as we finish that special matter.

Admiral Connolly. We will be here, sir.

Chairman Stennis. All right, if we may proceed now, please. We will be glad to have anyone stay who wishes.

General Axtell, you are going to present here what we call tracked

vehicles, right?

General AxTELL. Yes, sir.

Chairman Stennis. Do you have a statement?

General AxTELL. I do, sir.

Chairman Stennis. All right. Suppose we put that in the record now and you can read points of it or summarize it in such a way as you see fit for emphasis.

General AXTELL. All right, sir.

STATEMENT OF MAJ. GEN. GEORGE C. AXTELL, U.S. MARINE CORPS, ASSISTANT CHIEF OF STAFF, G-4, HEADQUARTERS, U.S. MARINE CORPS; ACCOMPANIED BY MAJ. F. L. TOLLESON, U.S. MARINE CORPS, HEAD, PROGRAMS AND BUDGET SECTION, HEADQUARTERS, U.S. MARINE CORPS

General Axtell. Mr. Chairman, in summary, the fiscal year 1971 Procurement Marine Corps budget request for items requiring authorization reflects the inclusion of weapons as authorization items. As a result the Procurement Marine Corps budget activity titled "Tracked Combat Vehicles" has been changed to "Weapons and Combat Vehicles." In this budget activity we are requesting \$53.1 million of which \$48.7 million is for tracked combat vehicles and \$4.4 million is for "other weapons." The most significant items in this activity are the second year of our multiyear procurement of the new assault amphibian vehicles. This is a second increment which consists of \$33.5 million for [deleted], LVTP-7, \$3.3 million for [deleted] LVTC-7, the command vehicle, and \$2.4 million for [deleted] of the recovery vehicle versions. One item in our request we are requesting be deferred. This is a training device for the LVTP-7 family. We were not able to start the R. & D. effort on time and we desire to evaluate the training device in the same critical manner as we have the LVTP-7 program.

In the weapons category we are requesting \$0.1 million to complete our procurement program of the Multishot portable flame launcher. This 4-shot, 66-millimeter rocket launcher provides a capability of firing a pyrophoric round 800 meters. We are also requesting \$1.2 million to complete our procurement of the 60 millimeter mortar.

In guided missiles we are requesting \$26.1 million to reinstate the Improved HAWK Missile System. This program was deferred by the Congress last year due to slippages in the Army's development program. The Improved HAWK Missile System is required if we are to have a deployable surface-to-air missile that is capable of coping with the increased capability of aircraft.

That is a quick summary, sir, of our full program.

Chairman STENNIS. Your statement will be placed in the record. (The statement follows:)

Mr. Chairman and members of the committee, I am Major General George C. Axtell, the Assistant Chief of Staff for Logistics for the Marine Corps. It is a privilege for me to appear before you to present the Marine Corps fiscal year 1971 program for the procurement of weapons and combat vehicles and guided missiles.

In the weapons and combat vehicle budget activity, we are requesting \$48.7 million to procure tracked combat vehicles and \$4.4 for weapons. In the guided missile budget activity we are requesting \$27.6 million to commence procurement of the improved Hawk missile, its battery fire control and support equipments and other missile support. I will address each of these items in sequence, and for each significant item, VU-graphs will display our requested program, the significant characteristics of the item, and a picture of the item.

The most significant item in the Marine Corps fiscal year 1971 procurement request is the second year of the multi-year procurement of the new family of assault amphibian vehicles, the LVTP-7. You may recall this item as the LVTPX-12, a designation which was used while the vehicle was in the test stages, but it has been type classified the LVTP-7. In fiscal year 1971 we are requesting \$33.5 million to procure [deleted] LVTP-7 vehicles, \$3.3 million for [deleted] LVTC-7 (LVTCX-2), the command version, and \$2.4 million for [deleted] LVTR-7 (LVTRX-2), the retriever version. As this committee knows, it is the responsibility of the Marine Corps to develop, in coordination with other services, the doctrine, tactics, techniques, and the equipment employed by landing forces in an amphibious operation.

Assault amphibian vehicles, both of the personnel and cargo carrier versions and the ancillary versions, are used primarily to transport landing forces, their supplies and equipment from ship-to-shore through rough water and the surf zone to inland objectives, and for subsequent tactical operations ashore. The assault amphibian vehicle in the Marine Corps inventory, the LVTP5A1 family, has been in srevice since 1955. Its life expectancy was projected at 15 years, but it will have been in service for 17 years when the LVTP-7 family can begin to replace it in 1972. These LVTP5A1's have served the Marine Corps, and on occasion the Army, very well for the past 15 years. The majority of these vehicles have been rebuilt one or more times. However, as the end of the projected life expectancy draws near, greater maintenance and repair parts support are required to keep them serviceable. This support requirement will continue a significant upward trend for the duration of the service of this vehicle family.

The LVTP-7 is superior to the LVTP5A1 in every way. A comparison of the characteristics of the two families indicate this very well. In addition to costing less to buy, our tests reveal that the operating costs of this vehicle are \$20 less per operating hour. The LVTP-7 is 11.6 miles per hour faster on land and 1.6 miles per hour faster in the water. In water it is more maneuverable because it uses a hydrojet steering system in addition to its tracks.

Hydrostatic steering provides full control at all speeds, which is particularly critical during the initial loading/unloading of the vhicles from the transport ship carrying them and when it must negotiate the high surf and changing forces of ocean currents when transiting from sea to land operations. Its cruising range on land is 110 miles greater than the LVTP5A1, while in the water its cruising

range is 10 miles greater at the 1.6 miles per hour greater speed. It uses more economical diesel fuel. The vehicle requires only 1/3 of the maintenance manhours currently required on the LVTP5A1, or 6.5 man-hours per 100 hours of operation.

In addition to the basic troop and cargo carrying version, there are several ancillary versions of this vehicle. The LVTC-7 is the command and control version. The LVTR-7 is the recovery version and is equipped with tools, a power winch, and a crane for recovery and repair work. The LVTEX-3 which will become the LVTB-7, is in the service, troop and engineer testing stages. It is the engineer version designed for mine clearance and obstacle reduction operations.

The current amphibious vehicle program [deleted]. This will completely re-

place the current family, the LVTP5A1 by 1974.

The LVT training device will be capable of simulating, in real time, operations throughout the entire range of an LVT's capabilities, in either the land or water mode. Environmental variables and hazards to be included in the device capabilities will include simulated debarkation from amphibious shipping, the movement from ship-to-shore, the transition from water to land, to include negotiating a sure zone up to 10 foot plunging surf conditions. The training device will simulate these events in sight, sound, and feel, and require the trainee to respond accordingly. Although it is expected that principles and techniques presently employed or being developed for aircraft operational flight trainers may be adaptable for the LVTP7, further investigation and development of high risk and technical capabilities is required. Therefore the initial R&D effort has been deferred until FY 1971 to permit more detail service evaluation of this program and as such the \$1.3 million requested in fiscal year 1971 will not be used until fiscal year 1972.

Our request for funds for weapons for fiscal year 1971 includes \$1.2 million for the procurement of [deleted] 60MM mortars and \$1.1 million for the procurement of [deleted] XM202 multishot launchers. The 60MM mortar remains the Marine Corps rifle company's sole indirect fire weapon. The unqualified success of this mortar in Vietnam thoroughly justifies its retention in our force structure. The quantity of 60MM mortars requested will allow the Marine Corps to attain inventory objective for this item. The XM202 multishot launcher will provide the infantry an organic, lightweight, shoulder fired weapon capable of neutralizing point targets by virtue of a rapid fire incendiary rocket capability. The quantity of multishot launchers requested constitutes the buy-out of the item and provides for losses throughout the life of the system.

In addition to the funds required for major end items in our fiscal year 1971 budget, \$11.3 million will be required for all other equipment and support. Of this \$11.3 million \$700.000 is for various collateral equipment for vehicles current in our inventory, \$600,000 for first destination transportation charges, \$6.5 million for spares and repair parts, and \$3.5 million for various items less

than \$500,000.

In guided missiles we are requesting authorization to procure [deleted] Improved HAWK missiles and to modernize 5 battery sets of fire control and ground support equipment. This will be the first phase of a three year program to introduce the Improved HAWK into the Marine Corps. Funds to commence procurement of this system during fiscal year 1970 were deleted by the House Appropriations Committee during actions last year to permit further development and refinement of the system by the Army.

The HAWK system, in conjunction with Marine fighter aircraft, provides vital air defense against enemy air attacks. The system is designed for a high degree of effectiveness at low altitudes. It uses an advanced radar homing guidance system which can discriminate against ground clutter, thereby en-

abling the missile to make intercepts of the lowest flying aircraft.

The Improved HAWK system is typified by the Improved HAWK battery. The Vu-Graph shows the major items of equipment which make up a HAWK battery. The pulse acquisition radar, information coordination central, continuous wave acquisition radar and the range-only-radar comprise the acquisition and control group. Two high-power illuminator radars and the guidance system within the missile comprise the guidance group, and the launchers and loaders comprise the launch and handling group. The battery control central exercises tactical control of the system.

One of the significant changes in the Improved HAWK system over the Basic HAWK system is the addition of the information coordination central, which contains an automatic data processor. [Deleted.] Another significant improvement in this system is in the performance of the missile itself. The improved HAWK missile has a higher performance rocket motor, a more powerful warhead, and an improved, smaller guidance package. The missile, as well as the illuminator guidance radar, can discriminate against ground clutter on the basis of speed of the target, thus providing the low altitude intercept capability.

Additionally, the Improved HAWK system employs the "certified round" concept. This means that testing of the missile is not done at the battery level. This "certified round" concept and build-in test equipment within the radars of the Improved HAWK system reduce significantly the test equipment at each battery All of the improvements to the missile itself were accommodated within the basic HAWK airframe, permitting the present launcher and transporter to be retained with only minor modifications. Each of the other equipments in the system require electronic modifications, but the basic unit structures are retained.

A comparison of the Improved HAWK system with the Basic HAWK system shows a significant improvement in performance. The Improved HAWK missile has [deleted] greater range, [deleted] increase in maximum altitude, and a vastly improved warhead. With the addition of the automatic data processor, reaction time for engagement has been reduced [deleted] the Improved HAWK system can acquire, track and intercept targets with speeds [deleted] greater than can be handled by the basic system. The system also has greater inherent reliability than the basic HAWK system.

The currently approved program will equip [deleted.] Each of the Improved HAWK system, and provide five battery sets of equipment for support and

training.

In addition to the \$26.1 million for the initial procurement of the Improved HAWK missile system, \$1.5 million is being requested for all other missile support. Of the \$1.5 million, \$2 million is for first destination transportation charges, \$.6 million is for spares and repair parts, and \$.7 million is for various items less than \$500,000.

In summary, the authorization being requested of Congress is for programs which the Marine Corps has considered carefully. Development and testing of the assault amphibian vehicles have been successfully pursued. Development and testing of the Improved HAWK have been closely monitored to insure that the equipment to be procured meets our requirement. I would like to emphasize that the funds approved by Congress will be administered with the utmost care to provide the highest state of readiness within the Marine Corps.

This concludes my formal statement. I shall be glad to answer any questions the committee may have regarding this request.

FISCAL YEAR 1971 WEAPONS, COMBAT VEHICLE, AND MISSILE PROGRAM

[In millions]

Weapons and combat vehicles	Quantity	Cost
Tracked combat vehicles: LYTP-7 assault amphibian vehicle family		\$39. 2 3. 1 6. 4
All other. Weapons: Mortar 60-mm. M19.		6. 4 1. 2
Launcher multishot XM202		3. 1
Total	[deleted]	53. 1
Missiles. Battery fire control and support elements. All other missile support.		14. 8 11. 3 1. 5
Total	[deleted]	27. 6

LVTP-7 ASSAULT AMPHIBIAN, FISCAL YEAR 1971

[Dollars in millions]

			Quantity	y Unit cost	Request
VTP-7VTCX-2)	í	\$33.
VTCX-2 VTRX-2			[Deleted]	_	3. : 2. :
Total					39. 2. 1.
ill other					
Total			•••••		42.3
Note: Invitation for bid multiyes	ir contract award a	nticipated June 19	70.		
	COMPARISO	ON OF CHARACTE	RISTICS		
		LVTP5A	1	LVTP-7	
Init production cost (average)		\$146,000)	[Deleted].	
Init production cost (average) perating and maintenance cost		\$72/LVT	/HR	\$52/LVT/HR.	
and speed		30 m.p.l) 	41.6 m.p.h.	
vater speed		6.8 m.p.	n	8.4 m.p.h.	- 4
Vater steer control		1rack		nyarojets and/o	r track.
uel canacity	•••••	456 gali	ons gasoline	180 gallons dies	el
uel capacity rmament roop capacity rew		30 calit	er MG	30 caliber MG.	••••
roop capacity		34		25.	
rew				3.	
	Fiscal year 1970	[In millions] Fiscal year Fis 1971	cal year Fiscal	year Fiscal year 1973 1974	
OSD approved	1970	1971	1972	1973 1974	Tot
VTP7 VTCX2 (command) VTRX2 (recovery) VTEX3 (engineer)	38)			
VTCX2 (command)	• • • • • • • • • • • • • • • • • • • •				
VTEX3 (engineer)		1			
Total vehicles	38	[Deleted]			
ehicle cost	\$30.4	Ingigrant			
rovisioning	3	1			
ill other		1			
Total cost	30.7	J			
Note: Provides the Marine Corp.		ity of landing the	essault elements	of A standard MFF'	s and A lie
MEF's.	•				
MEF's.	OTAR, INFANTR	Y 60MM.M19—FiS	CAL YEAR 1971		
MEF's.	OTAR, INFANTR	Y 60MM.M19—FIS	CAL YEAR 1971	.	Reque
MEF's. M Manufacturer	IOTAR, INFANTR	Y 60MM.M19—FIS millions of dollars	CAL YEAR 1971 Quantity	.	
Manufacturer	IOTAR, INFANTR'	Y 60MM.M19—FIS millions of dollars	Quantity	y Unit cost	
MEF's. M Manufacturer	OTAR, INFANTR' [In	Y 60MM.M19—FIS millions of dollars	Quantity [deleted] 4. 1800-meter r	y Unit cost	
Manufacturer Vatervliet Arsenal	IOTAR, INFANTR' [In 2. Muzzle loaded. Launche	y 60MM.M19—FIS millions of dollars millions of dollars 3. High angle fire. r Multishot 2	Quantity [deleted] 4. 1800-meter r	y Unit cost [deleted]	1.
Manufacturer Matervliet Arsenal	IOTAR, INFANTR [In 2. Muzzle loaded. Launche	y 60MM.M19—FIS millions of dollars millions of dollars 3. High angle fire. r Multishot 2	Quantity [deleted] 4. 1800-meter r	y Unit cost [deleted] range.	1. deleted
Manufacturer Vatervliet Arsenal	IOTAR, INFANTR [In 2. Muzzle loaded. Launche	y 60MM.M19—FIS millions of dollars millions of dollars 3. High angle fire. r Multishot 2	Quantity [deleted] 4. 1800-meter r	y Unit cost [deleted] range.	1.

CHARACTERISTICS

(1) Shoulder fired, (2) recoilless, (3) incendiary rocket, (4) rapid fire, (5) range 200-700 meters.

Major subsystem contractors: Northrop Carolina, Brunswick and Electro Mechanical Division, Northrop.

IMPROVED HAWK MISSILE SYSTEM, FISCAL YEAR 1971

[Dollars in millions]

Quantity	Unit cost	Request
[Deleted] missiles	[deleted] (1)	\$14. 8 8. 5 2. 8
Total		26. 1

¹ Not available.

Characteristics, 1. modernization of current HAWK system; 2. new "wooden round" missile; 3. adds automatic data processing; 4. improves reliability, accuracy, lethality, range, response; manufacturer Raytheon.

COMPARISON OF CHARACTERISTICS

Missile	Basic HAWK	Improved HAWK
Maximum range	1	
Maximum altitude		
Warhead explosive		
SYSTEM:	Vingraced	
Reaction time (average) Target velocity handling		
Target velocity handling.		
Single shot kill probability (SSKP))	

COMMITTEE RECESS

Chairman Stennis. Well, we are going to have to ask you to be back here this afternoon. I think we will have more members here then, too.

Your story is strong and in good shape, it sounds to me. That redo on the HAWK missile is a matter that we want you to explain.

General AxTELL. Yes, that is the follow-on on the Army program.

Chairman STENNIS. Yes.

Well, we will resume our sitting now at 2:30.

(Whereupon, at 12:15 p.m., the committee was recessed, to reconvene at 2:30 p.m., of the same day.)

(Afternoon Session, 2:40 O'clock, Wednesday, March 18)

Present: Senators Stennis (chairman), Symington, Cannon, McIn-

tyre, Smith of Maine, Dominick, and Schweiker.

Of the Staff of the Committee on Armed Services: T. Edward Braswell, Jr., Chief of Staff; and Labre R. Garcia, professional staff

member.

Of the Staff of the Preparedness Investigating Subcommittee: James T. Kendall, Chief Counsel; Ben Gilleas, director of investigations; Ed Kenney, Don L. Lynch, David A. Littleton, and George Foster, professional staff members.

BACKGROUND OF MBT-70 SITUATION

Chairman STENNIS. The committee will please come to order. This is an interruption of the hearing on procurement for the Navy. I have asked Admiral Connolly and the other gentlemen to stand aside, until we take up a matter. I will give a very brief background.

You remember last year we had the new tank in the Detroit yard that they had trouble with and we gave them some money to try to work that out. We also had this Main Battle Tank. It had moved along slowly in joint agreement with Germany and we asked Mr. Packard to take a special look at it.

He made a preliminary report in December and another one here

a few days ago.

Now, I have been greatly concerned about it. In November 1968 I was in Western Europe and went to the eastern boundary line of West Germany where I found our troops in charge of one Col. Paul Baltes.

I don't want to embarrass him by my remarks but the way he conducted himself that day and commanded was my idea of a genuine soldier. His frankness and sometimes bluntness made a most lasting impression. I thought he would be a valuable witness here.

He is an armor officer, veteran of World War II, Korean War, and now and for some time has been in charge of the training there in this

area.

I spent a long rainy day with him out in the field, among the tanks, among the men, and later went over to visit a German unit with him. Through it all, he proved himself, in my mind, the picture of a very competent man.

I think we ought to have more witnesses in here with a little mud on their boots and find out how these things work out in the field,

and what they think about the needs.

Now, I requested that he be asked to come here unbriefed and uninstructed by anyone. I have talked to him only briefly myself.

We have with Colonel Baltes Mr. Volz who is an American citizen now stationed in Heidelberg, Germany, where he has been for several years. He is with Army Intelligence and an expert on armor and particularly on Soviet armor, more particularly on Soviet tanks. So I am going to put him on the stand after we hear from the colonel.

I asked you gentlemen to be here today. I think the testimony of each will be very valuable. On the tank especially, Colonel Baltes, testimony will be in the printed record where we can have the benefit of his knowledge and whatever he says.

So members of the committee, this is Colonel Baltes here and,

Colonel, if you will take a seat down at the end of the table.

I want to thank you again for coming here, and just a few more words for the record and for the committee.

WITNESS BACKGROUND

Colonel Baltes is originally from Pennsylvania. He enlisted in the Army in October 1942. He went to OCS in March 1943. He served, of course, during the war and was separated in the grade of captain in April 1946, offered a regular commission in August 1946 which he accepted and has been on duty continuously since that time. He took part in the war in Korea.

By the way, he has three sons that are now in the service. One is a sergeant in Victnam, one is an OCS candidate, and one is a graduate

of the U.S. Military Academy now in Europe.

Now, you already know why I asked you to be here. You know our conversation had been for only a few minutes. I want you to start with what you are doing out there now with our troops but move quickly, if you will, into this proposition about the tanks, what you have there now, what you think about them, and since you came here at my suggestion, you went out and saw the beginnings of this Main Battle Tank 70.

All right, Colonel, you proceed now in your own way and any Senator who wishes will ask you questions.

STATEMENT OF COL. PAUL BALTES, U.S. ARMY

Colonel Baltes. Mr. Chairman, as you mentioned, I command the 7th Army Training Center which is the largest training center for U.S. Forces in Europe. It consists of three major training areas, Grafenwohr, Hohenfels, and Wildflecken plus a Combined Arms School which is on the Grafenwohr reservation.

This Combined Arms School teaches basic gunnery, tactics, and

maintenance of our combat vehicles in Europe.

To set the stage for the question about the tanks, I think first a quick, brief look at what we are facing in Europe is appropriate. In Europe the Warsaw Pact and the NATO forces looking at each other are basically two mechanized armies. By mechanization I mean if a war comes, we are going to fight a moving war very fast, very quickly, on tracked or wheeled vehicles.

Now, the basic and the main item in both the Warsaw Pact forces and the NATO forces, particularly the Allied Forces, Central Europe which is facing the Warsaw Pact forces, the basic element of

these forces is the main battle tank.

The main battle tank is an offensive and defensive weapon and it is designed for exploitation and the lead in the assault. I won't go

into Soviet tactics. I think my colleague, Dr. Volz, is much more educated in that matter but basically the idea of the attack is to strike hard and fast with armor, make penetrations, overrun the defenses, get into rear areas, destroy artillery positions, supply dumps, lines of communication, and get to the rear. This is the mission of the Soviet forces and I am sure it will be the mission in battle of our forces to a degree. I say to a degree because as you all know, the concept of the defense in Europe is defense, and our forces strung across and facing the Warsaw Pact forces naturally will be, if they attack, on the defensive first.

Now, I am not—I can't go into any strategic or tactical concepts of what the parts are because I really don't know them all but basically our tactics would be, if attacked to gain some time by trading some space. That is we would fight a delaying action from the cavalry regiment on the border back into Central Europe until we could move our forces, regroup and counterattack, at least blunt their attack. The blunting of the attack can be carried out in many ways. Naturally we would prepare the area with barriers and do everything we could to delay the enemy.

With a sufficient amount of antitank weapons and antitank defenses we could destroy a good part of his onslaught of armor. However, the tank in a defensive role must also be ready for an offensive role in various confrontations, because we must stop him and if we slow him down a little bit then our armor can counterattack and re-

store the battlefield or break up his formations.

Basically this is our tactical concept.

We are now faced in the Warsaw Pact countries, and this is just in Poland. East Germany, and Czechoslovakia—I am not relating any part of the Soviet Union or the forces of—Soviet forces in the Soviet Union. Right now the Warsaw Pact-

Senator Schweiker. You mean all of Eastern Europe?

Colonel Baltes (continuing). I am talking about Czechoslovakia,

Senator Schweiker. The Balkans?

Colonel Baltes. No, sir. Just the three countries that are facing Western Europe, Poland, now overrun Czechoslovakia and the Soviet Forces in Eastern Germany plus the East German Army itself.

They can bring to bear on us roughly now [deleted] main battle tanks. To oppose those forces, in Allied Forces Central Europe, the Allied Forces can bring together about [deleted] tanks. Of these the United States is contributing approximately [deleted].

Now, the Allied Forces in Central Europe, I am talking about, in-

clude U.S. Forces, German Forces, Netherlands, British, Belgium,

and one Canadian brigade.

This equipment in the hands of the Allied Forces is of a vintage, particularly the U.S. vintage, of a 1960 vintage. M-60 tanks with which the U.S. Forces are equipped were first produced or first fielded in the 1960's and they have been in the field ever since. The German armies have been—the First German Corps and the Third German Corps in the north have recently been mostly equipped with the new German Leopard tank which was produced to fill their needs for a main battle tank of this current area to replace the M-48 and M-47 series tanks which they received from us after the war.

I think we all must realize that the German tankers were equipped with our M-47, M-48 tanks right after the war when we equipped our fleet with M-60's. I say after the war. I mean when the German Forces began to build up their army.

Therefore, the status of our M-60 fleet in Europe now, while still active and still a very fine tank, is reaching a point where we are shortly going to have to consider a new tank or replacement tank.

Gentlemen, Mr. Chairman, I think I have covered the background.

Were there any other specific areas you wish me to address?

M-60A1-E2 TANK FUTURE

Chairman Stennis. Well, I have some questions and others will, too. Are you familiar with the M-60 A1-E2?

Colonel Baltes. Yes, sir. The M-60 A1-E2 is a tank that was developed here, I believe 4 or 5 years ago, at least started 4 or 5 years ago, which incorporated the basic M-60 chassis and placed upon it a turret which contained the SHILLELAGH missile currently found in the M-551 Sheridan tank. When I was in that tank 2 years ago it was at that time a very sophisticated piece of equipment. I understand it has had troubles and is still in trouble, perhaps, as far as getting on the road.

Chairman STENNIS. What do you think its future is?

Colonel Baltes. Sir, Mr. Chairman, I don't know what the R. & D. people say. I believe if for some modest sum, and I am not sure—today what a modest sum means I don't know really, but if for some modest sum this tank could be equipped and fielded as a battle tank it would be some help. However, personally, if the funds—if we cannot get this thing operating with a modest amount of money. I personally would not want to see the new tank, the main battle tank, jeopardized by this tank.

Chairman STENNIS. Well, in other words, you would say to put the money on the new tank. Is that taking you too far? I don't want to

put words in your mouth.

Colonel Baltes. Sir, as I say, unless this could be recouped for a modest sum, this would be what I say. I would like, however, if I could for the record, to perhaps get some figures for you, Mr. Chairman, on what we are talking about in re-equipping this tank for putting it in the field. I don't know this answer right now.

(The information follows:)

Of the total \$282.1 million spent in the M60A1E2 program, \$53.2 million is not properly chargeable as PEMA cost since the \$282.1 million includes \$32.6 million for M60A1E2 assets that have been used as offsets in other Army programs and \$20.6 million for RDT&E, O&MA and MPA expenses. The result PEMA (investment) cost to date is \$228.9 million and the production unit cost of the M60A1E2 tank without fixes is [deleted]. The 30 September 1969 Selected Acquisition Report (SAR) contained [deleted] unit cost, however, the SAR unit cost included estimated PEMA costs through FY72. If Engineering and Service tests lead to a decision to produce the M60A1E2 the Army plans a production/retrofit program of [deleted] tanks. The average unit cost per tank to produce/retrofit [deleted] tanks is estimated at [deleted].

Chairman STENNIS. You are not expected to be versed in this field, but if I get it correctly, you do not advise spending much more time or money on it, is that right?

Colonel Baltes. That is correct, sir, unless they can clear it up and

get it moving.

M-70 EVALUATION

Chairman Stennis. Now, what about this M-70 tank that you went out here in Maryland and saw at my request?

Colonel Baltes. Well---

Chairman Stennis. What is your impression? You are an armor officer, right?

Colonel Baltes. Yes, sir.

Chairman STENNIS. And that has been your specialty a good number of years?

Colonel Baltes. Yes, sir.

Chairman Stennis. And tanks in particular.

Colonel Baltes. Yes, sir.

Chairman Stennis. All right. Now tell us what impression you had

of this when you saw it yesterday.

Colonel Baltes. First of all, I would like to preface my remarks with the fact that until I got on that tank, on this prototype version of the MBT-70 yesterday, all I knew about the MBT-70 was what I read about it. I understood it was taken under joint effort by both the Germans and United States some time ago and recently it was split out for reasons as I read, cost mostly. I don't know.

The tank is a very sophisticated vehicle. It has a lot of very fine and excellent features that should be incorporated in our main battle tank of the future. As it stood yesterday it was still in the hands of the contractors' representative. They are running some tests on it. We could

not drive it and naturally we could not shoot it.

I believe that this tank has a great deal of potential. However, there are certain aspects of this tank that I believe should be looked at in greater detail from a user standpoint. I believe also that we should consider the human engineering factor.

Chairman STENNIS. Pardon me now just a minute. You are talking about this proposed new tank. You say some features should be looked into in greater depth. Would you specify what you had in mind?

Colonel Baltes. Yes, sir. As I say again, I don't know all the parameters of this. I understood when the Germans and the United States decided to split out that the United States now is going to take some equipment off this tank to make it either cheaper or more effective.

In discussing this with the Germans and talking to the Germans what they intend to do with their version of the MBT-70, I understand they are going to go for probably [deleted]. In our tank I believe we are still—planning to go with the gun missile launcher.

This is what I mean, sir, about certain aspects. I don't know exactly what our engineers have decided to do stripping down the joint de-

veloped tank to meet our specifications.

Chairman Stennis All right. Why do you think we need the new

tank?

Colonel Baltes. If we were to take the M-60 A1-E2 and use that instead of a new tank I don't think we are looking far enough and getting our technology far enough into the future. We are retrofitting a basic M-60 tank and while it may be a good tank for a period of time we are not getting far enough out ahead. I think it would be better to take more time and get a better tank for the future.

VALUE OF TANKS AS BATTLE WEAPONS

Chairman STENNIS. Well, I want the record to show what your ideas are about the proper uses of a tank. I have been told that after all, only 14 percent of the tanks knocked out in World War II were knocked out by another tank, and someone else argued to me that time had passed the tank by as a weapon.

Now, as a soldier out there on the battlefield in battle what is your

response to that?

Colonel Baltes. Mr. Chairman, time has not passed out the battle tank. The proponents of the anti-tank weapon versus the tank have a point that in the defensive role the antitank weapon has its place, but as I pointed out, the tank is not a defensive weapons per se. It is basically an offensive weapon. It can kill other tanks but the main job of the tank is to get those tracks on the objective and it is to counterattack or to attack, not to sit and wait for the other fellow to come to you. Now, this is the basic reason we have tanks, not to defend but to attack.

Chairman Stennis. Well, for the record now, when you are going on attack and there is a breakthrough, what is the role of the tank in following up on that breakthrough and getting to the other elements?

Colonel Baltes. It is to get through fast, destroy artillery positions, overrun their rear, destroy supply dumps, disrupt communications. cut up and demoralize the rear and seize and hold ground. This you cannot do with an antitank weapon to any great degree.

Chairman Stennis. Well, that is one of the arguments that we heard made in good faith in the last year—that really the antitank weapon was what we needed now primarily, and we could get by with

most anything for a tank.

Now, you are versed in these things. Some of us are not. I am not. But you can't, you just can't substitute the TOW or any other antitank weapon for the use of what this Army needs on the field in offensive

and defensive weapons.

Colonel Baltes. That is correct, Mr. Chairman. The combined arms team of our military today is truly a combined arms team. We have armor, we have infantry and with the infantry is antitank weapons. We have artillery and we have the supporting arms of engineers, aircraft, and so on. This is a combined arms team. To pull one element out of that combined arms team we weaken it and that other element cannot suffice for it. The antitank weapon cannot do the role of the tank.

Chairman Stennis. Now going back to your figures, you said a number of allied tanks are there on the ground in Europe.

Colonel Baltes. Approximately [deleted].

Chairman Stennis. And then you said that Czechoslovakia and East Germany plus the Soviets in East Germany and Poland had how many?

Colonel Balites. [Deleted] is the total, I would say roughly over [deleted] is the total we added up. This is from an intelligence estimate.

Chairman Stennis. What you are testifying here to is very obvious. It is your professional opinion on this problem based on your experience as you confront it every day. Is that correct?

Colonel Baltes. Yes, sir. That is a correct statement, Mr. Chairman.

Chairman Stennis. For how long have you been stationed in Germany?

Colonel Baltes. I have been there a little over 3 years, sir, about

three and a half years.

Chairman STENNIS. Well, I want everyone else to have a chance to ask you any questions they want and you can feel free to say anything else that may come to your mind, Colonel.

Senator Dominick.

Senator Dominick. Mr. Chairman, I am not an expert on the subject,

so I will loan my time to whoever wants to use it.

Chairman STENNIS. Let me express an interest in this for Senator Russell. I advised him of your appearance, Colonel Baltes, and he hoped that he might be here today. He wanted to hear your testimony and has asked for a copy of it.

Senator Symington.

TACTICAL DEPLOYMENT AND USE OF TANKS IN THE EVENT OF EUROPEAN WAR

Senator Symington. Thank you, Mr. Chairman.

Colonel, I was interested in what you had to say, the way we have been handling Vietnam, all these rules, regulations, and restrictions, not only on the Navy and Air Force but also on the Army. The terrain out there in Vietnam is not what you might call tank country. But to the best of your knowledge, if we had a confrontation that resulted in conventional warfare, there would be a lot of tanks used in Europe, wouldn't there?

Colonel Baltes. Yes, Senator, there would be. A tremendous number of tanks.

Senator Symington. And as I understand it, the reason we spend all this money estimated around \$14 billion a year with respect to our NATO commitment, is because we want to have a capacity for flexible response, hold the enemy up for a while so they can have second thoughts as to whether they really want a nuclear war. Is that the way you understand it roughly?

Colonel Baltes. Yes, sir. As I say, I am not a strategic planner but from the tactical point of view, our job on the ground would be to delay them, block them, slow them down, destroy them if we can. The

decision to use the other stuff is way beyond our—

Senator Symington. I understand. The thought occurred to me, however, in that it has so often happened in the past, that any attack in Europe would be across the northern plains of Prussia. They would be hitting, we would be defending, so maybe that is where the relative increased interest in tank destruction came. This as against an operation, say, like that in France and Germany of General Patton, when we were doing the shoving in World War II. Isn't there justification for that thinking?

Colonel Baltes. I believe, sir—I hope I have not misled anybody that we do not need antitank weapons. We need them and we need improved antitank weapons. We need longer range on our antitank weapons. I believe, though, that there is a certain group who feel be-

cause we have antitank weapons that can kill tanks, there is no longer

a need for a tank, and this I believe is false.

The fact is that the tank must be present to restore the battlefield, if we stopped them. If they gained 100 yards and you can't take that 100 yards away from them, then they have gained a hundred yards and as I say, I believe that as in athletics we must play to win. We don't play to tie. A defensive ball game you never win per se.

Senator Symington. I wish you would tell that to some of your superiors over there in the Pentagon incident to what we are doing now. I

agree with you.

USE OF SO-CALLED OBSOLETE TANKS

Last year, spread around, there were some [deleted] American tanks considered obsolescent to obsolete. Various countries were trying to buy them from various other countries that we had given them at one time or another. The [deleted] you are talking about are in addition to any obsolete tanks in Europe that might be of interest to say Asian countries like India or Pakistan.

Colonel Baltes. May I run down—these [deleted] tanks are not all U.S. tanks. Let me just give you if I may a rundown of the allied tank forces as we see it today on the ground ready to fight in Europe. That does not include our prepositioned tanks or any airlift flown in or anything. These are tanks that could be mustered to fight tomorrow if we had to. [Deleted.]

Senator Symington. Would you not go into too much detail, and submit for the record, because I don't want to take up too much of

my time. Just a summary.

Colonel Baltes. [Deleted.] This is what I mean when we talk about our total tank strength.

SOVIET PARITY WITH U.S. TANK CAPABILITY

Senator Symington. A final question.

The Chairman tells me you are well up on this, your knowledge of the subject. What do you think our tank position is as against the Soviet tank position?

Colonel Baltes. You mean in relative quality of tank? Senator Symington. You mentioned the quantity.

Colonel Baltes. Yes. sir. [Deleted.]

Senator Symington. How about quality?

Colonel Baltes. Basically our U.S. tank is the [deleted] the fielded Russian tank, too. Our M-60A-1 is [deleted] the T-54 and T-55 and the tank now being increasingly introduced in new numbers, the T-62. Again, I will defer on important details to Dr. Volz. Our 105 gun is a good gun. We do not have gyro stabilization on the U.S. tanks but we have an accurate range finder. The Russians have gyro stabilization. [Deleted.]

Senator Symington. So quantitatively they have us outnumbered

[deleted]; and qualitatively we are [deleted] correct?

Colonel Baltes. What we have on the field today; yes, sir.

Senator Symington. Thank you, Mr. Chairman.

Chairman STENNIS. Thank you, Senator.

Senator Schweiker.



CAPABILITY OF TANK IN WARFARE

Senator Schweiker. Colonel, what you are saying, if I understand you correctly, is that if we want to maintain a presence and have a chance of defending Europe we need tanks and we probably ultimately need some new tanks.

Colonel Baltes. Yes, sir.

Senator Schweiker. No. 1. No. 2, that in terms of whether a tank is obsolete, you are saying that an antitank gun is fine for defending yourself but if you are going to have a chance of winning even though you are attacked first you have to have a weapon that can go back and counterattack and that only can be done by a tank as opposed to antitank.

Colonel Baltes. I would say the tank is the main weapon in the counterattack. We have to have infantry, artillery, and supporting

arms.

Senator Schweiker. In terms of the question Senator Symington asked you I understood you to say that our most recent tank on the field and the Russian tank are [deleted].

Colonel Baltes. [Deleted]; yes, sir.

Senator Schweiker. That is all qualitywise. You weren't talking numberwise. You are not saying being outnumbered [deleted] we are [deleted]. You are saying tank for tank.

Colonel Baltes. Tank for tank. We have [deleted].

Senator Schweiker. Being outnumbered [deleted] we are behind the eight ball.

Colonel Baltes. I am not saying we are behind the eight ball. We need help. This is where we need the balanced team of antitank weapons and tank weapons.

CLARIFICATION OF M-60A1 TANK

Senator Schweiker. Also, the latest tank that you folks have over there, American tank, is the A1-M.

Colonel Baltes. M-60A1.

Senator Schweiker. So a sailor can understand it, what is the difference between an A1E and M-60?

Colonel Baltes. The M-60 was the basic tank. All of the A1 did was put a different configuration on the turrets, an elliptical turret, added more space, same fire control, same gun, basically the same tank.

Senator Schweiker. When you made a statement in your opening statement that you would be willing to spend some money on revising a tank but it wasn't worth an awful lot of effort as opposed to a long-range new buy, I am not quite sure which tank you are talking

about. Repeat what you said there.

Colonel Baltes. This was in response to the chairman's question about the M-60A1E2. This I guess has been a controversial tank for many people for the past several years because it was developed with the basic M-60 body but placed upon it was a turret that contained the SHILLELAGH missile system which is a missile fired gun tube tank. It has been in trouble. I have not seen the tank in 2 years.

Senator Schweiker. You haven't seen——

Colonel Baltes. M-60A1E2. It has not been fielded.

Senator Schweiker. What is the latest tank you have over there?

Colonel Baltes. In Europe, M-60A1. Senator Schweiker. And this is the E2.

Colonel Baltes. No. E2 has not been sent to Europe.

Senator Schweiker. I am still confused as to what is the latest model you have and what model we are talking about.

Colonel Baltes. The latest model we have in Europe is the M-60A1

tank.

Senator Schweiker. And you are talking about what.

Colonel Baltes. The Senator was addressing I believe the quantity of [deleted] tanks out in the vicinity of Detroit which are still waiting a fix. They are all the M-60A1E2.

Senator Schweiker. And what is the difference between that and the

one you have?

Colonel Baltes. The chassis is the same, suspension system is the same. They took a new turret and put it on this one which contains the Shillelagh missile system.

Chairman STENNIS. That hasn't worked yet so that is why it is held

up.

Senator Schweiker. And that is what you are saying we shouldn't spend too much more effort on because we are just buying an interim

weapon.

Colonel Baltes. That is correct. I would say as an individual, my personal opinion, if we are going to spend a great deal of money on that tank at the expense of our Main Battle Tank, I don't think it is going to be worth it in the long haul.

Senator Schweiker. What will the M-70 be able to give you if it works the way the fellows would like to see it work, that you don't

have now?

Colonel Baltes. It will give us a much more sophisticated tank on the battlefield, that is in terms of speed, stabilization, ability for firstround hits, better fire control, better durability, perhaps, and a better sophistication of fire control that will assure first-round hits.

ARMORED FORCE LEVEL IN EUROPE

Senator Schweiker. Now, we have [deleted]. They have [deleted]. I think our MBT-70 buy is only [deleted] if I recall correctly. Even if we bought the whole works for something like \$2 billion, we still wouldn't have but [deleted] of the tanks replaced. Does that really solve the problem? In other words, you have got [deleted] talking [deleted] even putting \$2 billion more, we are still only going to replace [deleted] your tanks, if in fact they all go to Europe. I don't know if they will all go to Europe. Is this really going to meet your needs and are we kidding ourselves about only buying—

Colonel Baltes. I think you have addressed two subjects. Let me

try to break them out.

First of all, I hope I have not led anyone to the opinion that I think we need a great deal more tanks, that we want to get on parity of [deleted] with the Russians. This is not what we are saying. I didn't intend to imply that.

What I have said is we are outnumbered but we don't want to get in the position of being outnumbered and obsolescent at the same

time in Europe.

Insofar as our new tanks, the MBT-70, I think we should go ahead with the new tank. Whether we call it MBT-70, or whatever our engineers come up with, now having split away from the Germans, I think we ough to go shead with it.

Senator Schweiker. We are debating whether to authorize a buy of [deleted] if I recall the figure correctly, of these new tanks if in fact it works. My question to you is assuming we go ahead-

Chairman Stennis. Senator, excuse me just a minute. That produc-

tion won't come for [deleted] years at best.

Senator Schwerker. That is my point. Is what we are buying for \$2 billion really going to meet the problem that he is concerned about?

Chairman STENNIS. I mean the numbers to be decided will be way

in advance, far away from now. We are not making a decision on that now.

Senator Schweiker. Well, maybe I should put the question another way, then. To not become obsolescent which is your main point, will all [deleted] of those tanks have to be replaced within the next couple of years?

Colonel Baltes. We are talking—again I want to only address the fact that we are talking about roughly [deleted] U.S. tanks. The Germans have gone into their Leopard production and are producing a tank comparable to our M-60 to fill their interim need while they after the splitout go on working on their own MBT-70. So we are talking about U.S. forces currently in Europe [deleted] tanks.

Senator Schweiker. You are saying if you get a modern updated

tank that works-

Colonel Baltes. Sometime in the future.

Senator Schweiker. [Deleted] will meet your needs?

Colonel Baltes. [Deleted] would replace our existing forces in Europe today.

Senator Schweiker. Will it be adequate to defend Europe under a

Soviet attack?

Colonel Baltes. I can't say that. I couldn't answer whether it would be adequate or not. I say if we got [deleted] modern tanks that they replace the [deleted] currently authorized in Europe. I can't say.

Chairman Stennis. Yes, excuse me. But I am advised that the [deleted] of the Main Battle Tank 70, are [deleted].

Senator Schweiker. [Deleted.] That answers my question. Are our allies, then—did you say Germany—are the rest of them updating their tanks?

Colonel Baltes. Yes, sir. Let me say this. The Germans are getting rid of their 48's which was our second tank after World War II. They are getting rid of those by replacing them with this Leopard tank which has the same gun, incidentally, that our M-60 tank has on it. So they are getting, well, a relatively freshly new tank. It has no greater capability than our current M-60.

Chairman Stennis. Excuse me just a minute. The Senator's time is about to run out and I believe if I may suggest we be a little briefer

in our answers.

Senator Schweiker. I have expired my questions.

Chairman Stennis. We have another witness. I am not cutting you off. Do you have another question or two you want to ask?

Senator Schweiker. No. I didn't want to cut his answer off.

I am done.

Chairman Stennis. All right. Did you want to complete your

answer there? I interrupted you.

Colonel Baltes. No, sir. I just said basically the answer is yes, they are updating their fleet. Every European country is.

LEOPARD TANK

Chairman STENNIS. Thank you. Senator McIntyre.

Senator McIntyre. Just a few questions, Mr. Chairman.

How does that Leopard tank compare with the 70? You indicated in your answers it is comparable. Is it better in any way?

Colonel Baltes. No, sir. I didn't indicate it was comparable to the

70.

Senator McIntyre. No, the 60.

Colonel Baltes. M-60. The Leopard is comparable to the M-60. It is a lighter tank. It is a newer tank. They just built it. It is a faster tank but as far as fire control and combatability, it is equal to our M-60.

Senator McIntyre. Any sense in buying a thousand of those?

Colonel Baltes. I don't believe so.

Senator McIntyre. You are not—you are not a test and evaluation man?

Colonel Baltes. No, sir.

Senator McIntyre. But you did see the 70?

Colonel Baltes. I did see—what is up at Aberdeen is a prototype of the 70.

Senator McIntyre. You didn't get a chance—you couldn't drive it, couldn't fire it.

Colonel Baltes. No, sir.

Senator McIntyre. I think you did in one of your answers say something about the human factor. Did some things occur to you that should be improved from the standpoint of operations?

Colonel Baltes. No, not improved, but I think as we move down the road in sophisticated weaponry we must remember the human being that is going to have to fight it and I think we should incorporate in this who is going to operate that tank and start working on him right now.

Also we should concurrently with the development of the tank develop the training aides that go with it, trainers, the turret trainers, this sort of thing. Anything that new, we have got to train people and the more sophisticated we get we still have got to remember we are working with the same soldier.

Senator McIntyre. I don't know how much it costs but this tank changes its profile and I understand it does that for roadability, ability to lower its profile and pick up speed. Does that seem to you to be

verv advantageous?

Colonel Baltes. I think it certainly has an advantage for moving very quickly across country. If you have a high clearance you can get across places where you normally couldn't and then if you have to go into a firing position, you can sink down. If we don't have to pay too much money I think it is a very good thing.

Senator McIntyre. The big dispute over here has been centered around cost. These things are reputed to cost in the vicinity, or they

were up until the refinements that Secretary Packard has now defined, of about \$600,000 per copy. That is a pretty expensive piece of machinery.

That is all, Mr. Chairman.

Thank you very much. Thank you, Colonel.

Chairman Stennis. Did you say you are through?

Senator McIntyre. All through.

Chairman STENNIS. Senator Smith.

ROLE OF TANK IN A NUCLEAR WAR

Senator Smith. Mr. Chairman, I have only one question.

Colonel, we are talking in terms of conventional warfare. What role

would the tank have in a nuclear war?

Colonel Baltes. I think it has a very important role. The tank by its very nature being an enclosed fighting vehicle and able to—with its heavy shielding effects of its armor, will probably survive on a nuclear battlefield as well as any other piece of equipment we have out there, if not better.

Senator Smith. Thank you.

Chairman Stennis. Thank you, Senator Smith. I am going to ask now that Mr. Arthur Volz come around, please, and have a seat at the end of the table.

Members of the committee, I mentioned Mr. Volz earlier. He is with the Office of the Deputy Chief of Staff for Intelligence, U.S. Army, Europe, being an intelligence specialist and directly concerned with weapons and equipment of the Warsaw Pact nations.

From 1943 to 1945 he was on active duty in the Army. From 1953

to 1970 he has been an intelligence specialist.

Now, we are very glad to have you here, sir.

I haven't talked to you about this except very briefly. We want you to tell us what you know about Soviet armor, particularly the tanks, and how it fits into this picture and this problem we have.

STATEMENT OF ARTHUR VOLZ, OFFICE OF THE DEPUTY CHIEF OF STAFF FOR INTELLIGENCE, U.S. ARMY, EUROPE

Mr. Volz. Sir, I think that Colonel Baltes has made it clear that we are outnumbered approximately [deleted]. The Soviets consider armor and especially tanks to be their main striking force, equally usable both in conventional war and in war under nuclear conditions.

Colonel Baltes has mentioned the nuclear capability of the tank.

They are offensively minded and they intend frankly to, if war comes, blitz us as the Germans did the French and the Allies in 1940.

Currently they teach in their doctrine an advance of 100 kilometers or slightly over 60 miles per day. Whether they will be able to achieve this, this is a fortune of war. But they are organized and equipped to do this. They will do this largely with the tank which will carry the attack and be accompanied, of course, by infantry on armored personnel carriers.

Now, [deleted] with their tanks that we do, but on the other hand, they are equipped to fire from the move for all modern Soviet tanks for several years, approximately 15, in fact, have a gyro stabilization

system which permits them to fire the main armament and the sec-

ondary armament with the machinegun on the move.

In their doctrine they frankly hope through the use of their mass and their firing on the move to move very fast and heavily close with us so that any fire control advantage we may have will be out the window.

Frankly, right now anything below [deleted] our tanks are one for one dangerous. The first man who lines up his cross hairs and fires is the man who is going to win the tank-to-tank battle. But remember, we are facing a [deleted] force. That is without any reinforcements.

The Soviet tanks are represented by a number of models and they vary in degrees of efficiency ranging from the T-54 to the much more common T-55, and of course the newer T-62 which is coming in in

quite large quantities.

All of these tanks represent actually evolutionary stages in development. The Soviets have an equipment and armament policy which is one of constant development and retrofit. They are constantly working and introducing new models while at the same time going back on their old models and putting in things that are newer such as the older T-54 tanks have been given newer stabilization systems. Newer ammunition has been developed for the older tanks. They seem to feel capable of spending the two amounts of money, the refurbishing of the old equipment and the development of the new models.

Currently we are [deleted] but we have not seen as yet—we may see it tomorrow morning—the characteristics of which we don't know. [Deleted.] This is all, of course, at the edge of our knowledge. But their efforts seem never to cease either in tanks or any other field and they consider the tank to be a very important weapon, important in the offense and also, of course, important in the defense, because like our forces, if they are forced on the defensive, they will try to conduct

their defense combat in an offensive manner.

This is no different than any army. In fact, even the Swiss and the Swedes who will not attack anybody too much believe that they will fight their defensive battle with tanks which they are using in an offensive manner. They believe that one has to have a sword as well as a shield.

Mr. Chairman, I hope I have helped clarify this.

EVALUATION OF LEOPARD TANK

Chairman Stennis. Well, it has been very interesting. I am going to pass any questions now.

Senator Smith?

Senator Smith. I have none.

Chairman STENNIS. Senator McIntyre?

Senator McIntyre. Well, I would just like to ask about Leopard

again. You know the Leopard tank pretty well.

Mr. Volz. Yes, sir; but my business is to concern myself with potential enemies and right now we are dealing with the Warsaw Pact. I would like to defer that question.

Senator McIntyre. The question I am asked so frequently by people who think we spent too much 1:10ney on offensive and defensive weap-

ons here is, Why don't we buy the Leopard tank? Why doesn't the United States buy the Leopard tank?

Mr. Volz. We have right now a tank armed with the same gun,

the M-60.

Senator McIntyre. Comparable.

Mr. Voiz. The same British gun. A British 105-millimeter gun which they put on their Centurion, we bought for the M-60 and the Germans bought to put on the Leopard. The same gun. A little different in minor details but the British 105.

Senator McIntyre. The Leopard is faster, though.

Mr. Volz. Yes, sir.

Senator McIntyre. How many miles an hour faster?

Mr. Volz. I do not know.

Senator McIntyre. I don't want to get into the strategy of this thing.

Chairman Stennis. Senator Dominick. Senator Dominick. I have no questions. Chairman Stennis. Senator Schweiker?

RANGEFINDER

Senator Schweiker. Just a question on the rangefinder. What do

we expect their rangefinder might do?

Mr. Volz. Well, let's say right now we have an optical rangefinder which has an effective range of, I believe it is [deleted] meters which allows us to get a pretty accurate estimate, let's say, on the basis of how far the enemy is out there and to attack him, to fire at him at this range and on in.

It is optical.

If we have to use it at night we have to modify it and use at present some sort of an illumination system or something. If they [deleted]. And something we are working on, too.

Senator Schweiker. The Frankfort Arsenal has been working on

the laser rangefinder since I have been here.

Mr. Volz. Yes, sir, but we don't have it on the tank and [deleted]. Senator Schweiker. That is all.

MOBILITY FIRING

Senator McIntyre. Mr. Chairman, may I just ask a question? You

mentioned that all of the Soviet tanks fire while moving.

Mr. Volz. They teach, in fact, to give you a quote [deleted] their main mode of fire on the attack or the counterattack is firing on the move.

Senator McIntyre. Are we both talking about the same thing? I haven't been talking about the tank moving and firing.

Mr. Volz. Yes, sir.

Senator McIntyre. Now, the other question, does that M-60 allow us to do that?

Colonel Baltes. No, sir. We have to stop and fire.

Senator McIntyre. Now, have you seen the main battle tank?

Mr. Volz. Yes, sir; I was with Colonel Baltes yesterday in Aberdeen. Senator McIntyre. You know the colonel has testified, and we are concerned with the fact, that we are trying to develop a tank for the

future, one that is going to be able to compete with everything and, according to testimony here, not only compete but far exceed anything the Russians have. That is our hope. This tank changes profile, fires the SHILLELAGH missile and the 155 from the same barrel. It has all the gyros and stabilization capabilities you can talk about: accuracy, fire while moving. It changes its profile. It hits along at about 55 miles an hour; is that right?

What do you think of this tank? Let's take the dream and say here

it is, it is ready to go into production.

Mr. Volz. Sir, this is now a private opinion, personal opinion, because this is not my field of professional endeavor. I would say if we perfect this tank or even perfect 90 percent, you can gain a great jump over the Soviets because the [deleted] et cetera.

Senator McIntyre. Two man crew?

Mr. Volz. No, sir. It is three. Senator McIntyre. Thank you.

PREFERENCE

Chairman Stennis. Thank you, Senator. I want to address this question to the Colonel.

Colonel, out there where you do the day's work, would you prefer [deleted] of these MBT-70's, assuming that they are made to work. or [deleted] times [deleted] of the present tanks, because we could

buy [deleted] times as many with the same money.

Colonel Baltes. Sir, first of all there is a question of manpower. I want to mention that first. And second, though, even if we—if you did that now, we would still be looking to the future, Mr. Chairman. We still must get out ahead of ourselves and get another tank in the future. How far I don't know but I believe we should move ahead.

Chairman STENNIS. So even though you would like that large a

number it would be at the expense of-

Colonel Baltes. Quality.

Chairman STENNIS (continuing). Modernity and quality. All right. Now, I have heard reports about the German tanks, so many of them knocked out by planes in the Battle of the Bulge. Could you give us anything on that directly? Were you in that area?

Colonel Baltes. No, sir; I was not.

Chairman STENNIS. Could you shed any light on the claim that they

just decimated the German tanks by air?

Colonel Baltres. I can only make the observation, sir, that a tank is vulnerable from the air to a great degree. However, there are means and methods of shooting down enemy air as we well know, and I think unless you get direct hits by the aircraft, I don't think the threat from the air against the tanks is as great as it is sometimes made out to be.

Chairman STENNIS. Well, you talk about this offense by the Soviets and their tanks. What is the first line defense in your opinion against

these offenses? Is it tanks or antitank weapons or both?

Colonel Baltes. A combination of three items, sir. The barrier plans which we would have as to demolitions, blowing down bridges, trees, antitank, then the antitank weapons of our infantry combined with the defensive fires of our tanks and then the counterattack role of our tanks and infantry to stop them and drive them back. We have to have a combination of all these elements.

Chairman Stennis. Well, you are very convincing but it is a little

hard for me to take it in as fast as you can make your points.

In Europe, what would be the principal use of this new tank? Will it be to fight other tanks, stop other tanks, or used mainly as a mobile support weapon for the infantry?

Colonel Baltes. The basic use if it replaced our current tanks would be in a tank battalion, the mobile role, defensive initially perhaps but

then the counterattack.

Chairman Stennis. And, of course, the antitank weapon has a place in there.

Colonel Baltes. Yes, sir.

Chairman Stennis. For our side.

Colonel Baltes. Yes, sir. The tanks usually work in conjunction with the infantry and the infantry will be manning the antitank

weapons.

Chairman Stennis. Well, as I get it, then, to combat this Soviet force of tanks, you would want tanks of a superior quality if possible plus the antitank weapon.

Colonel Baltes. Yes, sir, we would. I would.

Chairman Stennis. Senator Cannon, this is Colonel Baltes that I told you I asked to come over here and he is accompanied by Mr. Volz who is a civilian in intelligence with our Army in Western Europe.

Colonel Baltes has discussed the tank at length—the present ones, the future ones, and the German ones—and Mr. Volz has given his opinion about the Soviet tanks. Do you have some questions?

Senator Cannon. Mr. Chairman, thank you very much. I must apologize. I was tied up in a conference with another committee.

Chairman Stennis. Just glad you got here.

Senator Cannon. I will read the record. I do not have any questions at the moment.

Chairman Stennis. All right. Thank you, Senator.

Senator Goldwater was there this morning and as he is unable to be here this afternoon he talked at length to Colonel Baltes. Did he see you, Mr. Volz?

Mr. Volz. No, sir.

Chairman Stennis. Are there any other questions from anyone? Colonel, is there anything further you wish to say?

Colonel Baltes. Nothing, Mr. Chairman.

Chairman STENNIS. Mr. Volz.

Mr. Volz. No. sir.

Chairman STENNIS. Well, we thank you gentlemen very much for coming here. I know you have helped me and I believe you have helped all of us. Other members of the committee will read the record and this will be printed and be a part of our presentation on the floor.

So again thank you very much and we certainly hope you get back

safe and sound.

Senator McIntyre. Mr. Chairman, one last thought on this tank. Is any thought being given to allowing the Germans to go ahead and develop this tank? They have their own MBT-70 going. I remember the Germans were the first guys to show us how to use these tanks.

Chairman Stennis. They are going their way with their version. We

have settled the matter with them.

STATEMENT OF VICE ADM. T. F. CONNOLLY, DEPUTY CHIEF OF NAVAL OPERATIONS (AIR)—Resumed

POSEIDON CONVERSION

Chairman Stennis. For the benefit of the Navy, I said we needed somebody here once in a while with mud on their boots. We need somebody here with a little salt spray on them, too. And here is a man. Do you have anything else you want to say now on any of these subjects? Admiral Connolly. No, sir, only if you ask questions.

Chairman Stennis. As you know, this is Admiral Connolly, members of the committee, and he has been the spokesman for the Navy on this matter we had up this morning, particularly the missiles and the F-14.

Suppose you have a seat down there and see if any member wants to

question you.

Let me make an announcement to the committee. Tomorrow we will continue our hearings on the Navy but we expect to have Mr. Tarr with us who has been nominated, will have been for 1 week, to be Director of Selective Service, and he will be available for questions. We will have an open hearing.

We also have a bill that Senator Moss from Utah wanted to testify

about with reference to a memorial at Pearl Harbor.

All right, we are back to our questions now about the Navy.

As I recall, the POSEIDON program was initiated about 1965 to counter an expected large scale Soviet ABM deployment by about 1970. Since that time the POSEIDON program has been on an accelerated development and deployment schedule.

How many of the POLARIS submarines do you now plan to con-

vert to POSEIDON?

Admiral Smith. There has been no change in the number planned. The number is 31.

Chairman Stennis. All right. And what is your current schedule

now for these conversions.

Admiral Smith. There are [deleted] now under conversion. The first will finish its conversion [deleted] and will deploy in January 1971, and we are requesting authorization for six more in this next fiscal year.

(The information follows:)

Our current schedule for the 31 conversions is as follows: [Deleted.]

Admiral Smith. I might say that two of those were delayed from the end of the current fiscal year.

Chairman Stennis. What is the current status of development of the POSEIDON missiles! How many missiles have been fired and what were the results?

Admiral Smith. The POSEIDON missile is going along very well on schedule. There have been 16 flight tests. Eleven of those were successful and we have categorized five as failures, although there were many features of most of those that did operate properly. A few years ago we might have called four out of the five partial successes.

Chairman Stennis. Well, if you haven't filed a written statement on that, I think you had better file something for the record at this place with a complete report on those tests, the firings, how many were from underwater, if any, et cetera.

(The information follows:)

Results of POSEIDON test shots to date:

A [deleted] missile flight test program commenced in August 1968 and is planned to continue through mid-1970. The [deleted] development missiles may not be tested if contract requirements and development objectives are met. In the first 16 flight tests 11 were successful in meeting major objectives and five failed. Fixes made to correct faults found on the first four failures have been flown successfully on subsequent flight tests. The failures were as follows:

[Deleted.]

Admiral Smith. None have been yet fired from underwater. There have been dummy missiles fired from underwater. That was a rather extensive series of tests and all were quite satisfactory. The first live missile to be fired from a submarine we expect the middle of this summer.

Chairman Stennis. That means underwater, of course.

Admiral Smith. Yes.

Chairman STENNIS. Middle of this summer.

Admiral Smith. Yes, sir.

POSEIDON EFFECTIVENESS

Chairman Stennis. What is the difference in effectiveness in PO-LARIS and POSEIDON now assuming that there is no ABM offense

of the Russians? How does that change the situation?

Admiral Smith. In the absence of ABM, the principal advantage of the POSEIDON missile is an ability to vary the maximum range and hence the sea room as a protection against improvements in ASW. It also has some increase in coverage, that is, particularly for urban industrial targets, in that the smaller warheads can be distributed in a manner that is dictated by the particular target and not just a function of the design as in the case of the A-3.

I think those are the principal flexibility advantages in the absence

of ABM.

Chairman Stennis. You have included \$18.5 million for this PO-

LARIS A-3 missile. Now how will you fund that out?

Admiral SMITH. There is about \$3.4 million of the 18 and a half million dollars that is for special purpose instrumentation for the operational tests, for replacement of tooling facilities, maintaining the production capability, containers, transportation. The remainder is for services to maintain the reliability, performance evaluation in the amount of \$7.8 million, surveillance, about half a million dollars, reliability maintenance, six and a half million, and then about \$100,000 for logistic services and field technical services.

Chairman Stennis. Now, all the missiles requested through 1971 required for the SSBN's that will have been completely converted, gone over through their conversion, at the end of the 1971 missile

funded delivery period.

In other words, do the POSEIDON missiles requested through 1971 match up with the conversions completed through 1971?

Admiral Smith. Not precisely, no, sir.

Chairman Stennis. You can explain that for the record later if you don't mind because it is something that will be of interest to some.

Admiral SMITH. All right.

(The information is classified and was retained in the committee files.)

PREPARED QUESTIONS FROM SENATOR SMITH

Chairman STENNIS. Senator Smith?

Senator Smith. Mr. Chairman, I have an appointment in the office. May I leave some questions for the record? I will try to get back.

Chairman Stennis. All right. We appreciate your coming.

They will be placed in the record and you will respond to those, gentlemen, please, within a week if you can.

(Questions submitted by Senator Smith. Answers supplied by the Department of the Navy.)

Question. Admiral Connolly, how would the Navy defend a carrier against SHADDOCK or KITCHEN missiles after launching?

Answer. Defense against SHADDOCK or KITCHEN, once they have been launched, is not essentially different from any of the other anti-ship missile in the Soviet inventory. Both missiles are quite large and less than three feet shorter than our SKYHAWK, A-4 attack aircraft. Because it is large, relatively slow [deleted] and unable to perform defensive or evasive maneuvers, SHADDOCK is not a difficult target for an airborne fighter armed with either the SPARROW or SIDEWINDER missile. KITCHEN, on the other hand, flys higher and faster [deleted] and is thus a more difficult target for a fighter. If the fighter [deleted] KITCHEN can be knocked down with SPARROW. The F-14 fighter armed with PHOENIX will improve our air-to-air capabilities against all Soviet anti-ship missiles on which we have intelligence today.

If our fighters are not in position for intercept, or if they fail to destroy the incoming SHADDOCK or KITCHEN, then shipboard surface-to-air missiles will be used. The order in which surface-to-air missiles would normally be used is: TALOS at about [deleted] n.m., TERRIER at about [deleted] n.m., TARTAR at about [deleted] n.m., and Basic Point Defense Missile (SPARROW) at about [deleted] n.m. If the incoming missile survives these missile defenses, it is then under fire by anti-aircraft guns.

[Deleted.]

Question. Admiral Connolly, will you differentiate for us the roles of the $A\!-\!6E$, the $A\!-\!7E$ and the $F\!-\!14$?

Answer. The F-14A will be the Navy's first line fighter aircraft and as such will have a primary mission of air superiority. It will have secondary missions of fleet air defense, escort and visual air-to-ground bombing when needed.

The A-7E fulfills the Navy's requirement for a medium range light attack aircraft capable of delivering tactical nuclear weapons and most conventional ordnance in the Navy's inventory. It performs close tactical air support, armed reconaissance and interdiction missions. The A-7 operates primarily in a day/visual environment.

The A-6E fulfills the Navy's requirement for an all-weather capable medium attack aircraft. In this role it is able to (a) deliver special weapons under all weather, day/night conditions against heavily defended targets, (b) perform with conventional weapons a wide variety of all-weather, day/night interdiction missions involving detection, localization and destruction of moving or fixed targets, and (c) provide in a secondary role close tactical air support under all weather, day/night conditions.

FISCAL GUIDANCE

Chairman Stennis. Senator Cannon. Senator Cannon. Thank you, Mr. Chairman.

Admiral, what fiscal guidance did you receive from OSD originally in order to prepare the fiscal year 1971 budget?

Admiral Connolly. Senator Cannon, I might be mistaken but I

don't think we got any.

STRATEGY LEVEL CHANGE

Senator Cannon. You don't think you received any.

Admiral ConnoLLY. No. sir.

Senator Cannon. During our Tactical Air Power Subcommittee hearings you advised that a new JSOP was being prepared as a result of the national security memorandum No. 27 and national security study memorandum No. 3. Would you explain briefly the guidance in

the decision memorandum as to how it will affect the Navy.

Admiral Connolly. I am probably not the most expert, Senator Cannon, to respond to that, but I think I could say it quickly and best by saying that in our view we did not have the forces for a two and a half war affair. When we got the guidance to be prepared to face a one and a half war strategy, we looked hard at our forces to see whether we could do that and my major concern is that even that will be tough.

Senator Cannon. So that as a result of the new one and a half war strategy, you made no changes either in systems or personnel require-

ments.

Admiral Connolly. Well, that isn't quite true either, sir. We have been steadily coming down, and I have—I can give you some rather specifics. In the process of getting to the 1971 budget, to the one and a half strategy, these changes have taken place in naval air.

Now, they didn't all come back at the initial issuance of the NSSM NISDM, but they are part of it. For example, in 1969 we had 15 attack carriers, 15 air wings, nine Marine air groups, nine CVS's, eight CVSG's, [deleted] VP squadrons. And we were training pilots at the

rate of 2,850 a year.

To fit into 1971 we are planning to hold to 15 CVA's but we dropped two air wings. We have reduced from nine to eight Marine air groups, and we have dropped from nine to four CVS's, from eight to four CVG's, and we have gone from [deleted] ASW patrol squadrons and dropped our pilot training rate from 2,850 to 2,670.

So in this sense we do reflect a reduction.

Senator Cannon. Weren't those changes actually undertaken prior to the announcement of the new one and a half war strategy?

Admiral Connolly. Not all of them. Not all of them, sir.

Senator Cannon. Would you indicate which ones were not? Admiral ConnoLLY. Well, I would like to be precise and give it to you for the record.

CARRIER LEVEL REDUCTION

Senator Cannon. All right. If you will do that.

(The information follows:)

Reductions initiated subsequent to 11 Oct 1969 (date of the NSDM-27 strategy) are summarized below:

One air wing (five squadron plus supporting aircraft)

Forty-one ships (various class)

Personnel end strength reduced by:

2,891 officers

43,580 enlisted personnel

42-060-70-pt. 2-41



Pilot training rate reduced by 180
Marine Corps reductions in Tactical Air are:
Two fighter squadrons (plus associated training aircraft)
One VF/VA aircraft headquarters group
Personnel related to the above (1,259 officers and men)

Senator Cannon. Has the Navy received any decision or guidance that would indicate that higher authority has ordered or is planning on the Navy having less than 15 carriers in the near foreseeable future?

Admiral Connolly. The CVA level for fiscal year 1971 remains at

15 as I have said. This is a Secretary of Defense decision.

Now, it is entirely true that we are—that we have received fiscal guidance. We have been told what program total out through 1976 to plan for. We have received logistics guidance through this period. And we have been given, the services have been given, the Navy has been given the task on its own to fashion the forces that it believes will most—will best meet the task and the missions that the Navy has.

It is possible that in the out years the number could decrease if we cannot prove to our satisfaction and the satisfaction of the Secretary of the Navy and, of course, the Secretary of Defense that we can in fact sustain 15 attack carriers, hold the 13 wings that we have worked with our fellow airmen, the Marine aviators, to supplement our carrier air wings with their attack and fighter squadrons so that by using the assets that may be freed in Southeast Asia by the present planning, to be able to put full wings on all operating decks.

Now, to come back to your question, it turns out that as we study harder, and we are working on it all the time, and if our bosses think we can or we think we can't maintain 15 decks, then it is possible that we will drop to 13 or 14 decks. The number of decks that we

might drop to has not been determined.

Now, it is my own very strong hope that we won't drop, and the reason is that I think you know but a lot of people don't know that we in the Navy don't come up with the number of attack carrier decks that are in the U.S. forces.

These are determined by the commanders in chief of the unified commands who make the recommendations to the Joint Chiefs of Staff. The Joint Chiefs of Staff reach an agreed number. They pass this number to the Secretary of Defense and the decision is made outside the Navy from the inputs that come from the CINC's. Out of the six CINC's, and by that I mean commanders in chief, only two are naval officers. One member of the Joint Chiefs of Staff is a naval officer but four are not. So we don't determine our own force levels. They are not what the Navy says it ought to have. It is what the Joint Chiefs of Staff and the secretaries say they believe the Nation must have based on the recommendations of the principal military commanders.

Now, each time we have gone around. For the last several years the number of carriers called out by the JCS has been far in excess of 15, as high as [deleted]. Last year it was, if I remember correctly [deleted]. The JCS are again at this time in the process of getting out the carrier force level that they believe is required for the coming fiscal year 1972 and I believe this is going to turn out to be at

least [deleted].

That is all the information I have, sir.

Senator Cannon. What effect would a reduction in your 15 carrier

force have on F-14 procurement?

Admiral ConnoLLY. I think it would affect it in a proportion directly in accordance with the reduction from that 15.

FIGHTER PLANE REQUIREMENTS

Senator Cannon. What is your present F-14 requirement and how

was that computed?

Admiral Connolly. I will give it to you. It is 722 and that would be for [deleted] fighter squadrons for the Navy, [deleted] apiece. It would be for [deleted] combat readiness air wings, training for the Navy. There would be [deleted] in each—the first number, if I may go back, is [deleted]. The Marine Corps would have [deleted] plane squadrons, that is, a [deleted]. In their CRAW they would have [deleted]. We have six R.D.T. & E. aircraft so that the total operational UE would be [deleted].

By our experience with pipeline, and by this I mean planes in overhaul and in transit to and from overhaul, we would expect to have [deleted]. Our inventory objection for fiscal year [deleted] would then be [deleted]. Over the period [deleted] we expect to encounter an attrition of about [deleted] which reaches a total of 716 that we would hope to buy through [deleted] which includes six of the 12 R. & D. planes returned to fleet configuration. The total is then 710 PAMN and

12 R. & D.

Senator Cannon. Now, in view of the fact that your F-14C wouldn't come along until after the first 722, why are you anxious to proceed with the F-14C program this year, particularly in view of its high cost?

Admiral Connolly. Senator Cannon, I would like now, and I know I am on solid ground with respect to my bosses, to remove from the record book the concept of an F-14C. This came into being at the time I think you will remember when we shifted from an F-111B to F-14. We had the F-14A around the TF-30P12 mentioned, the F-14B around the advanced technology engine, and we were shifting to a F-14C where we were going to use the avionics that had been planned for the VFAX aircraft.

The passage of time and the work we have done in avionics development has made the concept of an F-14C not one that we should con-

tinue to work.

We will update and develop the systems as we have with all other airplanes and this will show up in the F-14 if and when there is a significant step forward in either propulsion, avionics or weaponry; but I think it is fair to say that we are no longer thinking specifically in terms of building an F-14C.

Senator Cannon. So that the estimated R. & D. cost for the F-14C of \$337 million is out the window now. We are not talking about that

figure any more.

Admiral Connolly. I have laid the groundwork for exactly that sort of a remark but before I let it go, I would like to ask, if I may, to let Captain Ames help me out here, just what would happen?

Captain Ames. Yes, sir. What we would like to do is to reprogram

the funding that was envisioned for the F-14C.

Senator Cannon. Are you saying, then, that you would still like to have that \$5.2 million that purportedly was to initiate R. & D. on the F-14C this year for an advanced radar to go ahead with that in this

year's program?

Captain Ames. No, sir. What happened last year appears to be what is going to happen in fiscal year 1971. Last year in the F-14B/C line item, or budget element, we used the F-14C radar money to meet contractual requirements of the advanced engine program.

In fiscal year 1971 we are going to have to take the money that was associated with the F-14C radar and apply it toward the Navy's share

of the advanced technology engine.

Senator Cannon. I see. Admiral, is the F-14 on schedule and is it proceeding satisfactorily?

Admiral Connolly. Yes, sir.

Senator Cannon. You have run into no major technical problems? Admiral Connolly. Not yet, sir.

MISSILE SYSTEM PROGRESS

Senator Cannon. How about the PHOENIX missile system? Is that currently on schedule and are you pleased with the progress being made there?

Admiral ConnoLly. It is on schedule and we are very pleased with

the test results to date.

Senator Cannon. How important do you believe it is for the Navy to acquire the CONDOR air-to-ground missile system, recognizing that it

has had substantial difficulties during R. & D. so far?

Admiral Connolly. Senator Cannon, we have had a shift in our thinking and this includes not just me but it includes Dr. Frosch and it includes also the representative of Dr. Foster, the Director of the Defense Research and Engineering, Mr. Allen Simon. We are going to provide material for the committee which will change the things that are in this year's budget in this way. We have asked for \$28.9 million authorization in missile procurement, \$6.0 million in aircraft modification of the A-6 to do the evaluations and for \$23 million in the R.D.T. & E. account to go ahead with the procurement of [deleted] missiles built with the production tooling. We are going to change that and we are going to ask the committee to give us only the \$6 billion in aircraft modification and the \$23.3 million in the R.D.T. & E. account. We will not build these missiles with production tooling. We will not contemplate production of the CONDOR but we will continue, subject to the committee's support of this, we will continue with technical evaluation and operational evaluation and at the end of the period of evaluation come to the committee and either say yes, we do want a certain fixed number of these weapons in the inventory or, no, it does not warrant your support.

At this point in time we are asking your support in going back to an R.D.T. & E. category with CONDOR and the reason we do this is times are tight, money is hard to come by, and the CONDOR would be an expensive weapon to make a decision on now and we are not

ready to make that decision under these circumstances.

Senator Cannon. Do you believe that the Navy's WALLEYE and the Air Force MK-84, the HOBO, are competitive systems and if so, do you believe that we need them both?

Admiral Connolly. To answer your question, Senator Cannon, inherently the HOBO and WALLEYE are competitive because they are electro-optical weapons and they do represent competition one to the other. However, we have reached an accommodation there which is not yet put in final form but is understood by ourselves, I think by the Air Force and by Dr. Frosch, our ASN for Research and Development, and by again this same gentleman in D.D.R. & E., Mr. Allen Simon. It goes like this.

The Navy needing \$2½ million to finish the development, the R. & D. for WALLEYE-II, and money which has been appropriated but not yet apportioned, would use that to finish the development of

WALLEYE-II.

Then we would like to do this. We would like to convert WALL-EYE-I of which we have [deleted] to WALLEYE-II's as a straight conversion rather than building any new WALLEYE-II's. This is much cheaper. This would put a real fine electro-optical weapon in the inventory for which we have spent a lot of money. Perhaps the Air Force would be willing to give up some of their [deleted] WALLEYE-I's. They would go ahead and build HOBO. Our score would consist of [deleted] WALLEYE-II's converted incrementally at a reasonable rate. Possibly [deleted] more. We might get as high as [deleted] WALLEYE-II's. This would be enough electro-optical weapons for us for a long while against a contingent use.

The Air Force meantime would proceed with HOBO. They would engineer a Navy compatible version of HOBO, do the engineering work connected with this. Then if the balloon went up or it looked like it might or we got down to where we had used a lot of our WALL-EYE-II conversions, we would be in a position to move in on that HOBO, Navy compatible HOBO production. And that is where we

stand at the moment.

Senator Cannon. Have you made arrangements with the Air Force

to turn over the [deleted] inventory that they have?

Admiral CONNOLLY. In response to the thinking that I have been describing, it was decided that Admiral Walker and General Gossick would form a team as they did on the advanced technology engine to try to work the terms of what I have been talking about out in detail and Admiral Walker might state how far they are.

Admiral Walker. At this point, Senator, we have just established contact with the Air Force and we are planning to meet within the

next week or two.

EFFECT ALL-VOLUNTEER SERVICES

Senator Cannon. Admiral, one final question. What do you think the effects on the Navy would be of doing away with the draft and going to an all-volunteer force?

Admiral Connolly. Well, there have been many periods, Senator Cannon, I am sure you know, when we had an all-volunteer force.

Chairman STENNIS. Excuse me, Admiral. Be fairly brief on that if

you can, please. Your opinion will be valuable.

Admiral Connolly. I think that we would be fine under an all-volunteer force but on the other hand, we have done very well with—very well indeed by the effects of the draft, I might say, because we

have gotten some excellent people, officers and enlisted both, and I have the private feeling that defense of the country is everyman's responsibility. I just have the private feeling that we have gotten some very wonderful people who probably would never have come into the military service on a voluntary basis except for the existence of the draft because they had other plans to do with their lives and these people having taken time out to be in the military have later turned out to be pretty great people.

Chairman STENNIS. Excuse me, Senator, I can allow you more time

if you want it.

Senator Cannon. No. Thank you, Mr. Chairman.

Chairman STENNIS. Admiral, anything else you want to say? Admiral ConnoLLY. No.

PREPARED QUESTIONS FROM SENATOR STENNIS

Chairman Stennis. We thank you very much and we thank the rest of you gentlemen. I do have some more questions here but we will submit those for the record.

(Questions submitted by Senator Stennis. Answers supplied by Department of the Navy.)

Question. You stated this morning that you have studied this problem of shutting down a production line and starting up with larger quantities and, as I understand it, you did not find this to be more economical.

I note, however, that the latest SAR report on the P-3C aircraft indicates that \$42.4 million in cost increases have occurred because of quantity reductions in FY 1968 and FY 1969, and that over the remaining years of the program an estimated \$231.7 million in cost increases will be incurred because of quantity reductions.

In light of this data in your report, do you believe that any of this cost increase could be reduced if the line were stopped and started ut a later date? This \$230 million is quite a large sum to incur because of these reduced quantities. Can you tell us how much it cost the Navy to start up this production line initially when you started production?

Answer. Our evaluation concluded that the P-3C cost increases attributed to quantity reductions would not be reduced if the production line was shut down and started up again at a later date. The cost increases indicated in the P-3C SAR report are our best projected cost estimates- costs projected through FY [deleted]. As you know, the P-3C is an extremely sophisticated weapons system which consists of new avionics equipments which are integrated through the use of a high speed digital computer. There are presently approximately 50 GFE contractors and 81 CFE subcontractors providing these highly complex equipments which are integrated through the use of a computer software program. Stopping the P-3C line and trying to get each of these contractors to start-up at a later date to meet a production schedule and achieve the quality product required, would entail a three year lead time for the restart and requalification of equipments.

The Original P-3 ORION line at Lockheed evolved from the commercial Electra production line and dates back to 1959. \$44 million for tooling can be identified to the P-3 line. This does not cover personnel training costs at the prime contractors or production line costs at GFE contractors plants.

Question. General, you are requesting \$24 million in total obligational authority this year to begin your Improved HAWK buy, \$14 million for [deleted] missiles and \$9 million for ground equipment. Arc you aware of the Improved HAWK test record?

Answer. Yes, sir. The test record of the sixteen Industrial Prototype missiles has been [deleted] successful, [deleted] unsuccessful, and [deleted] was declared a no-test.

The Marine Corps actively monitors the entire Improved HAWK Program. We have one officer on permanent assignment in the HAWK project office. Additionally, one of the responsibilities of our Development Center at Quantico, Virginia is to report to us on this program. They have four Marines actually participating in the service tests of the system. In this manner we are appraised of the status on a continuing basis.

Question. On what basis do you favor procurement with a test record of this nature?

Answer. We certainly would not want to procure on the basis of the current test record. The test program recommended by the recent Improved HAWK Design Audit Review Committee will be furnished this summer. If this program is successful and the reliability of demonstration in the fall is successful procurement could commence with confidence that we were buying a good system. If it is not successful we will not procure, but from our current information the probability of success is high.

Question. What confidence do you have that the Improved HAWK will work and on what is your confidence based?

Answer. If the test program recommended by the Review Committee is followed, I have confidence that the present missile problems will be corrected. The problem areas have been identified. This test program is designed to permit isolation of specific problems and allows time to correct them. Based on the findings of the committee the major problems appear to be in the areas of manufacturing techniques and system engineering. The new program should eliminate these faults.

Question. The contractor tells the Army the production line for HAWK will be shut down if the FY 1971 procurement funds are not okayed and it will take \$30 million to restart. Do you feel this pressure from the contractor has pushed this Improved HAWK program faster than tests justify?

Answer. I am not aware of this information.

Question. Is it wise to convert HAWK batteries now when you could end up with a missile that does not work?

Answer. The Marine Corps will not contract to convert battery equipment until the capabilities of the missile have been proven. The latest information indicates that the reliability tests will be accomplished during the [deleted] of fiscal year [deleted]. At that time our decision to procure will be made if all test results so warrant.

Question. The SAM-D will be the follow-on for the Improved HAWK. Are the Marines posted on this program as it relates to the Improved HAWK you wish to buy? Would the Marines replace the Improved HAWK with SAM-D in [deleted].

Answer. The Marine Corps closely monitors the SAM-D. We have a documented requirement for a system with characteristics postulated for the SAM-D. However, at this stage of the development process, it is premature to decide whether or not the Marine Corps will want to procure the new SAM system. If it meets currently postulated characteristics it will provide a significant improvement over the Improved HAWK, particularly in the area of [deleted] capability. However, it is considered that [deleted] is an optimistic availability date. A date that is based upon the assumptions of full funding and optimistic technical progress. Unfortunately the air threat of our potential enemies is such that there is an immediate requirement for improvement to our basic HAWK system.

Question. Under the RDT&E program, the Navy receives 20 to 24 CONDOR missiles for Technical Evaluation, in addition to those missiles tested by the contractor. The Navy's evaluation of these missiles is not scheduled to be completed until [deleted]. In view of this test schedule, is the purchase of [deleted] more missiles varranted at this time?

Answer. The Navy Technical and Operational Evaluations of the CONDOR missile system will follow the formal contractor demonstration scheduled from [deleted]. The Technical Evaluation is scheduled for the period [deleted]. The missiles for this evaluation are provided by the present RDT&E contract. The [deleted] missiles required for Operational Evaluation, scheduled for [deleted] must be contracted for in fiscal year 1971 to ensure continuity between the Technical and Operational Evaluations.

PREPARED QUESTIONS FROM SENATOR THURMOND

Chairman Stennis. Senator Thurmond is granted authority for his questions addressed primarily to Admiral Connolly to go in.

(Questions submitted by Senator Thurmond. Answers supplied by the Department of the Navy.)

Question. I note the two S-3A you want for FY 1971 will cost \$39 million each as you begin a \$3.6 billion program in this aircraft. Give me the costs and numbers of the P-3C and S-3A squadrons and why you need so many of these expensive planes.

Answer. The \$39M that you quote for each S-3A this year includes flyaway cost of \$24M and support cost of \$15.5M. The total PAMN request is \$101.7M which includes initial procurement and long-lead funding. A breakdown of what the \$101.7M buys is as follows: \$22.7 for advanced procurement of long lead items necessary to enable us to go into production if FY 1972. This includes advance money for the engine, training devices, and government funded equipment as well as items needed for the airframe. \$30.9M for support; this includes money needed to start software development of the computer based support system. \$48.1M can be assumed as the direct cost of the two initial aircraft themselves. or \$24.1M each.

We expect the total program unit cost of the S-3A to be \$14.7M. We are asking for 193 production aircraft to outfit [deleted] squadrons including training, pipeline, and attrition aircraft. The total program unit cost of the P-3C aircraft is [deleted]. The current approved P-3C program is [deleted] aircraft which will result in [deleted] squadrons of P-3C and [deleted] squadrons of P-3B, with training, pipeline and attrition. The S-3A and P-3C aircraft programs are essential to stay abreast of the growing Soviet submarine threat which now includes the Yankee SSBN *Polaris* type.

Question. Compare the range, bomb capacity, accuracy and other key points of the Harrier, A-4M and A-7E.

Answer.

Marine Harrier	A-4M	A-7E
]	11, 790 5, 400	19, 250 10, 200
{Deleted}	7, 500	12, 500 42, 000
	11, 200	15, 000
[Deleted]	580}	[Deleted
)	1,600	2, 600
[Deleted]	[Deleted]	1×20 [Deleted]
\$3. 4 \$4. 4	\$1.75	\$2. 2 \$2. 9
30	65	\$3. 5 374
		Harrier A-4M

			Marrier Harrier	A-4M	A-7E
Runway (feet)	Radius (nautical miles)	Loiter (hours)			
(feet) 1,000	25	Ò.5]		
2,500	100	1.0			
8.000	100	10	·····}[Deleted]		
Bombing system a	ccuracy (mils) ment (20-plane sqaudron) of	f/encl			

Note: When performing a typical carrier-based mission where length of runway is not a factor, the A-7E can carry (deleted) 500-pound bombs without external fuel tanks over a combat radius of (deleted) nautical miles. On a similar mission, the A-4M, with extrenal fuel tanks, would carry [deleted] 500-pound bombs over acombat radius of [deleted] nautical miles. Question. In view of these comparisons it appears the only advantage of the Harrier is its VSTOL capability. Do you feel it is worth giving up these other capabilities to get the VSTOL!

Answer. The Harrier aircraft advantages are not limited to its V/STOL capability. V/STOL will enable an order of magnitude of improvement in operational flexibility that will significantly improve responsiveness and the effectiveness of close air support. This means more battles won with fewer casualties. It will permit dispersal to sites without the recognition features of fixed bases that will greatly reduce vulnerability to enemy counter strikes. Its bases can be far more austere than conventional aircraft and less costly. The in-flight maneuverability of Harrier is unmatched in any other high performance jet due to its thrust-to-weight ratio and the employment of vectored thrust. This feature will reduce vulnerability to both the ground-to-air and air-to-air threat. Within the context of the intended employment of Harrier in the close air support role, the aircraft represents a capability not available in any other aircraft. These advantages far outweight the larger payload/range considertions represented in the other aircraft.

Question. In what ways is the A-7E superior to the A-4M?

Answer. The A-7E fulfills the Navy requirement for a carrier based medium range aircraft capable of carrying both tactical nuclear weapons and conventional weapons while performing a variety of missions, including interdiction, tactical air support and air superiority.

The A-4M fulfills the Marine Corps requirement for a short-field capable air-

eraft with a high sorties rate employing a wide variety of weapons.

The A-7E is superior to the A-4M in range and payload as previously shown. Based on design specifications and limited test and operational data, the A-7E has [twice] the accuracy of the A-4M in its present configuration. This difference is maximized in the interdiction role and minimized in the CAS role when weapons are released at minimum ranges or multiple runs. When the A-4M is fitted with the [deleted] substantial improvement in accuracy will be realized. The A-7E is equipped with a weapons/navigation system which is capabile of computing position within a distance equal to approximately [deleted] of the total distance traveled. This capability enables the pilot to navigate with sufficient accuracy to locate pre-planned targets at night and during periods of reduced visibility, the A-4M used in short range close support missions does not have a requirement for a comparable system. Target pre-planning in close support is minimized and targets are normally marked in some manner by other ground/air personnel.

The A-7E is equipped with a M-61 20mm cannon with a higher rate of fire than its predecessor, the MK-12 20mm cannon in the A-7A/B and the A-4M, which

improves effectiveness against small maneuvering targets.

Question. Are you not already retiring some the A-4 planes you bought earlier due to age?

Answer. The Navy retired the A-4A aircraft in March of 1969. The A-4A aircraft were 15 years old having been procured in 1954. The Navy is retiring the A-4B aircraft starting in FY 1970. The A-4B aircraft entered service in March 1956. The retirement of the A-4B aircraft is planned to be completed by July [deleted].

Question. Would two squadrons of A-7s be as effective as three squardons of A-4s?

Answer. When used against long range targets or targets located in high threat areas, where weapons are released from maximum slant ranges for increased survivability; A-7E weapons delivery accuracy and bomb carrying capability significantly reduce the number of strike sorties required to achieve specified kill probability. However, because of the large variety of potential targets and the many factors involved; such as mission objective, target locations, size and hardness, there is wide variation in the difference in effectiveness between A-4M and A-7E.

From the Marine Corps point of view, [deleted] squadrons of A-4s would be more effective than [deleted] squadrons of A-7s in the Short Airfield for Tactical Support (SATS) environment, where the ability to maximize the number of close air support sorties outweights range/payload considerations, and where differences in bombing system delivery accuracies tend to be minimized.

Question. While the A-7 is more costly than the A-4 why do the Marines want to buy three more wings of the A-4s after the FY 1971 purchase when you have a better plan in the A-7?

Answer. The presently authorized force levels for Marine A-4 squadrons is six. Two squadrons of [deleted] aircraft each are assigned to each of the three Marine Aircraft Wings. The Marine Corps plan is to continue operating the A-4 aircraft in these squadrons but attain modernization with the introduction of the improved A-4M. The Marine Corps believes that the A-4M will better satisfy its close air support requirements than the A-7E. The continuation of the A-4 aircraft has a bonus effect in that training and support costs are minimized.

Question. Will it cost so much to have a line of supply for only three squadrons of A-4s that it would outweigh getting a better aircraft in the A-7E?

Answer. The Marine Corps 1970's inventory of A-4 aircraft will be comprised of the A-4E, the A-4F and A-4M models. There is a 90 per cent commonality between the A-4E and the A-4F and an 85 percent commonality between the A-4F and the A-4M. Training requirements will be minimized since all newly commissioned jet aviators will have experience in the TA-4F/J aircraft during flight school. Existing support facilities and equipage will continue to be utilized which, if the A-7E were procured, would require total replacement.

STATEMENT OF ADMIRAL SHIFLEY

Chairman Stennis. The Chair requests that all answers be back within a week if at all possible.

Again we thank you very much, gentlemen. We will put in the record at this point a statement by Vice Adm. Ralph L. Shifley, Deputy Chief of Naval Operations Logistics.

(The statement follows:)

Mr. Chairman and members of the Committee, I am Vice Admiral Ralph Shifley, Deputy Chief of Naval Operations for Logistics. I welcome this opportunity to appear before you to present for the first time, the appropriation Other Procurement, Navy (OPN). This appropriation is included in response to the Committee's request to include "Other Weapons".

This appropriation funds all major Navy procurement except ships, aircraft, and missiles. Procurements range from quantities of expendable ordnance, weapons systems, electronics and communications equipment to miscellaneous

items such as forklift trucks, training devices, and spare and repair parts.

This appropriation contains seven Budget Activities: Activity 1 is Ships Support Equipment; 2, Communications and Electronics Equipment; 3, Aviation Support Equipment; 4, Ordnance Support Equipment; 5, Civil Engineering Support Equipment; 6, Supply Support Equipment; and 7, Personnel and Command Support Equipment.

We have included in OPN a request for \$2.8 million in FY 1971 that will require authorization by this Committee. All of these items are in Budget Activity

4, Ordnance Support Equipment. They are as follows:

5"/54 Lightweight Gun Mount MK 45 (Training). Procurement of one mount is planned during FY 1971 at a cost of \$1.3 million. This will provide a total of three mounts to be used at Fleet Training Centers and Training Schools. These mounts will be used to provide operational and maintenance training of the crews that will man these guns in the new construction ships currently planned to receive the lightweight 5"/54 mount. Forty-one mounts are included in the SCN appropiration FY 1967-1971 for the DLGN-36, DLGN-38, DD-963, and LHA-1 class ships.

Rifle, M16A1. Procurement of 1,290 M16 Rifles is planned in FY 1971 at a cost of \$160 thousand. These rifles are to be provided to the Republic of Vietnam

Navy for use in coastal and inshore warfare.

Minigun 7.62MM. Procurement of twenty-five miniguns and mounts is planned in FY 1971 at a cost of \$650 thousand. In addition, \$100 thousand is required for spare parts. This is light weight Gatling-type gun with an exceedingly high rate of fire (6.000 rounds per minute). These guns are planned for installation in Special Warfare Group Support Craft to support debarking or embarking personnel of SEAL teams and other special forces.

Items less than \$500,000. The procurement of 1,000 9MM weapons and 38 caliber revolvers for \$65 thousand in FY 1971 will provide for the replacement of outdated hand guns on U.S. Navy aircraft currently flying missions in combat zones. The weapons provide aircraft personnel with a means of self defense in emergency situations when forced down in hostile areas.

The FY 1971 planned procurement of 300 waterproofed 40MM Grenade Launchcers and 40 Underwater Defense Guns MK 1 for \$410 thousand will provide Navy combat swimmers (SEAL/UDT) with a 40MM Grenade Launcher attachment to the M16 rifle and a hand gun for self defense against hostile swimmers and

marine life.

The procurement of 20 M65 Gun Mounts 1971 at a cost of \$139 thousand will provide for the replacement of battle damaged mounts on small boats and riverine craft. This mount supports twin 50 caliber machine guns on boats which are planned for turnover to the Republic of Vietnam Navy as part of the Vietnamization program.

The funds remaining (\$140 thousand) in FY 1971 will provide for grenade launchers, mortars, machine guns, and pyrotechnic pistols for use by the Re-

public of Vietnam Navy in coastal and inshore waters.

Mr. Chairman, this completes our request for other weapons which require

authorization by your committee.

Chairman Stennis. Now, Vice Admiral Cousins, Deputy Chief of Naval Operations, Fleet Operations and Readiness, and he is supported by and I assume accompanied by all of these gentlemen whose names I will call. Rear Admiral Sonenshein, Commander, Naval Ship Systems Command; Rear Admiral Woods, Commander, Naval Ordnance Systems Command; Admiral Smith, Director, Strategic Systems Project Office; Rear Adm. W. D. Gaddis, Director, Budgets and Reports.

We also have with us Captains Engel, Crumpton, Commander Buck,

also Mr. Kahn.

STATEMENT OF VICE ADM. R. W. COUSINS, DEPUTY CHIEF OF NAVAL OPERATIONS, FLEET OPERATIONS AND READINESS; ACCOMPANIED BY REAR ADM. N. SONENSHEIN, COMMANDER, NAVAL SHIP SYSTEMS COMMAND; REAR ADM. M. W. WOODS, COMMANDER, NAVAL ORDNANCE SYSTEMS COMMAND; REAR ADM. L. SMITH, DIRECTOR, STRATEGIC SYSTEMS PROJECT OFFICE; REAR ADM. W. D. GADDIS, DIRECTOR, BUDGETS AND REPORTS; B. H. KAHN, STRATEGIC SYSTEMS PROJECT OFFICE; CAPT. W. F. ENGEL, NAVAL SHIP SYSTEMS COMMAND, COMPTROLLER; CAPT. J. R. CRUMPTON, SHIPS CHARACTERISTICS DIVISION COMMAND, OPNAV; AND, COMDR. J. A. BUCK, OPNAV

Chairman Stennis. Admiral, do you have a prepared statement? I assume you do.

Admiral Cousins. I do.

Chairman Stennis. All right. It is a very important part of your budget here that you gentlemen are going to handle. You will be given such time as you may need even if we have to carry over until morning.

How do you want to handle your statement, Admiral?

You may put it all in the record and then make such summary or highlights as you might see fit.

Admiral Cousins. I would like to submit it, sir, and for the present I would like to jump right into the really substantive part and skip about the first half.

Chairman STENNIS. All right.

The entire statement will be put in the record. Does that mean you are going to read it?

Admiral Cousins. Yes, sir. I would like to start reading with our

new construction, three nuclear attack submarines.

Chairman STENNIS. Where is that?

Admiral Cousins. Page 7.

Chairman Stennis. All right. The first six pages of the admiral's statement will be included in the record and then he will pick it up on page 7.

(The statement follows:)

Mr. Chairman and members of the committee, I am Vice Admiral Ralph W. Cousins, Deputy Chief of Naval Operations for Fleet Operations and Readiness. I assumed my present duty in August 1969 and this is my first appearance before this committee.

I will present the Navy's Shipbuilding and Conversion Program for Fiscal Year 1971. I am accompanied by Rear Admiral Sonenshein, Commander Naval Ship Systems Command, Rear Admiral Smith, Director Strategic Systems Project Office and Rear Admiral Gaddis, Navy Department Director of Budget and Reports, who are available to answer questions within their purview.

Reports, who are available to answer questions within their purview.

Before presenting specific details of the Fiscal Year 1971 program I will comment in general terms on our need for new ships and for ship conversions. This need is related to the types and numbers of ships required to meet our national strategy objectives. The finite determination of force requirements is of course subject to a number of conditional assumptions. The Secretary of Defense and other preceding witnesses have outlined our strategic objectives and our best judgment of the forces we need to meet those objectives.

We plan to have a fleet of about 761 ships at the end of Fiscal Year 1970.

We plan to have a fleet of about 761 ships at the end of Fiscal Year 1970. Major components of this fleet are shown on this chart, a copy of which will be provided to the reporter for the record. The major components of the fleet are:

uic.	
Fleet ballistic missile submarines, all of which have nuclear propulsion	4
Attack aircraft carriers, one of which has nuclear propulsion	1
ASW aircraft carriers	
Attack submarines, 44 of which have nuclear propulsion	10
Major surface combatants composed of cruisers, frigates, and destroyers.	
64 of these ships are equipped with guided missiles; 3 are equipped with	
nuclear propulsion	18
Destroyer escorts, of which six are equipped with guided missiles and six	
are configured for radar picket duties. All are equipped for ASW escort	
duty	4
Amphibious ships	10
Mine warfare ships	6
Underway replenishment ships	7
Auxiliary and miscellaneous ships	12
and the second of the second o	-

This fleet total compares with 932 ships at the end of Fiscal Year 1968 and 886 ships at the end of Fiscal Year 1969. As we reduce the size of the fleet in response to fiscal pressures we are retiring our older, less-capable ships and those not suitable for modernization through conversion programs.

Our plans for the future are based on maintaining the fleet's capability by modernization of existing ships and by providing more capable replacements. We plan to have about [deleted] ships in the fleet at the end of Fiscal Year 1978.

We have not yet devised a simple index by which we can judge the modernity or capability of an individual ship, but one useful indicator is age. No specific age is associated with the maximum useful life of Navy ships but it is our

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experience that an age of about 30 years for surface ships perhaps slightly less for submarines, is a reasonable maximum life expectancy for the hull, propulsion machinery and basic installations. On the basis of currently approved plans for ship construction and ship retirement, by the end of Fiscal Year 1976, 20 submarines will be over 28 years old and 178 surface ships will be over 30 years of age.

of age.

Ships do not, however, become obsolescent by reason of age alone. Changes in the enemy threat and advances in technology have regularly led to obsolescence of weapons and electronic systems in much shorter period of time than the 28 to 30 years of service we expect from hulls and machinery. Rapid technological advances in naval warfare since World War II have required extensive modernization of existing ships and incorporation of newly designed weapons, sensors, communication equipment and other new features in new construction ships.

Existing ships are modernized through the ship conversion program and through the ship alteration program. Extensive changes are made through ship conversions and these require one or more years depending on the type ship and extent of the modernizations. Minor changes are made by ship alterations during regularly scheduled overhauls. These overhauls are of several months

duration and normally occur at about three to four year intervals.

There is a limit, however, to the degree of modernization which is possible under the alteration or conversion program for existing ships. Some of the limitations in older ships are: the lack of space or volume for further growth within the hull; inability to add more weight without loss of stability; lack of electric power to accommodate new weapons and electronic systems; and, prohibitive costs. We consider the costs prohibitive when the cost of removing older weapons or electronic systems plus acquisition and installation costs of the new systems are excessive with respect to ship replacement costs or the useful life of the ship after conversion. Considering these factors, ship replacement by new construction is often more economical than piecemeal modernization and this is particularly so for older hulls.

Since further modernization is no longer practicable for our older ships, their replacement is required if we are to maintain the current fleet capability. Accordingly a large number of new ships will be required in each of the next several years. As you know, replacement ships become more expensive each year because of the combined result of inflation and the increasing sophistication of modern weapons.

Considering our need for other defense material and the necessity to keep our budget at a reasonable level, we cannot afford as many new ships as we need. Our Fiscal Year 1971 shipbuilding and conversion budget request is for \$2,578.9 million Total Obligational Authority (TOA). This will provide for 14 new con-

struction ships and 15 conversions of existing ships.

This request will provide new construction replacements for less than two per cent of our current ships. At this rate, approximately 50 years will be required to replace existing ships with new ones. Replacement in 30 years would require a replacement rate of 3½ per cent per year. Since many ships are now near or beyond their useful life limits, an even higher replacement rate than $3\frac{1}{3}$ per cent will be required in the next several years.

The Fiscal Year 1971 program is somewhat smaller than the program we requested last year. While it is smaller than we desire, it will nevertheless improve the fleet's capability. All of the new ships requested will replace ships

25 or more years of age.

With one exception all of the ships requested are similar to those we have had approved in recent years. That exception is the oceanographic research ship (AGOR), a small ship which will be built essentially to an existing commercial design.

We have provided each of you with data sheets which give the significant facts on each ship for which authorization and funding are requested. I will make copies of the applicable data sheets available to the reporter for insertion in the record. As I discuss each ship we will display a simplified version of this data sheet for your convenience. The format is the same as we used last year.

With your permission, I will now discuss in turn each of the individual ship types requested—first the new construction ships and then the conversions. The total Obligational Authority for 14 new ships is \$1,644.7 million; for 15 conver-

sions, \$543.6 million.

NEW CONSTRUCTION

8 NUCLEAR ATTACK SUBMARINES (SSN 688 CLASS)

These nuclear attack submarines are follow on ships of the high speed SSN 688 class. Procurement of this class was begun in the Fiscal Year 1970 program with the authorization and funding of three ships. In Fiscal Year 1970 advance funding for five future submarines was also provided. We had hoped to build five submarines this year but in order to live within limited funds, this budget includes only three ships. The advance funding in Fiscal Year 1970 will be used to support the three ships in this year's program and [deleted] of the ships now planned for the Fiscal Year 1972 program. We are requesting this year \$45 million additional advance funding for [deleted] more shipsets of long lead time materials, thus we will have sufficient advance funding to support [deleted] submarines in the Fiscal Year 1972 program. In the past we have pointed out that five nuclear attack submarines should be built each year; however we have not yet obtained approval for programs of this size. Transition of the total attack submarine force to nuclear propulsion is a basic and essential goal.

Our cost estimate for the three attack submarines in the Fiscal Year 1971 program is \$498.0 million. The Total Obligational Authority (TOA) request for these and the future submarine program is \$475.5 million. We plan to award the contract of these three ships in the third quarter of Fiscal Year 1971, as part of a multi-year procurement along with two of the attack submarines in the

Fiscal Year 1970 program.

1 NUCLEAR GUIDED MISSILE FRIGATE (DLGN) 38 CLASS

The nuclear guided missile frigate, formerly known as the DXGN, is now designated the DLGN 38 class. The first ship of this class was authorized and funded in the 1970 program. The ship we are requesting this year will be the second. An increment of advance funding for the second, third and fourth ships of the class was requested in the 1970 program. Congress appropriated advance funding for these ships plus an additional \$10 million for a fifth ship of the class. Advance funding sought in this year's request will complete long lead time material requirements of the third and fourth ships. We plan procurement of the [deleted] in Fiscal Year [deleted].

The task group concept of naval operations requires the availability of guided missile equipped surface combatants to provide protection to other surface forces

and to perform independent missions in the face of enemy threats.

For both independent duty and task group operations, nuclear propulsion permits the commander to position his ships with much more flexibility, since they are not dependent on tankers to bring them fuel oil for support. The overall capabilities of a nuclear carrier task group are improved each time a nuclear powered guided missile frigate is substituted for a conventional powered guided missile ship. The all-nuclear carrier task group is the Navy's objective.

Considering total numbers of guided missile ships required in the Fleet, and improved capability of task forces when all nuclear ships operate together, the Navy has developed a long range program goal for [deleted] DLGN 38 class

ships.

The cost estimate for this year's ship is \$213.8 million. The Total Obligational Authority (TOA) requested is \$221.3 million. Contract award is planned for third quarter Fiscal Year 1971 and delivery is expected in Fiscal Year [deleted].

6 DESTROYERS (DD 963 CLASS)

The six ships requested this year are a continuation of the DD 963 program begun in Fiscal Year 1970. Last year Congress authorized eight of these ships and appropriated funds for five of them, with advance funding for long lead time items for the next eight. Revised cost estimates, based on contractor proposed designs and current market conditions permit the procurement of only three ships, vice five, with the funds appropriated in Fiscal Year 1970. Contract award for the three to be procured with 1970 funds is planned this spring as the first increment of a 30 ship program. This approach is expected to provide us with effective destroyers at a minimum cost through the economies of series production and multi-year procurement, based on a strongly competitive design and bidding process.

As far as we can see into the future the Navy will require destroyers for offensive and defensive task group operations-including hunting and killing submarines, protecting naval and merchant ships from air attack, carrying out shore bombardment and other amphibious warfare tasks. Even with a projected reduction in our destroyer forces over the next decade, and moving forward promptly with the DD 963 program a substantial number of our destroyer assets will still be 30 to 35 years old in 1980. These older ships will be no match for the projected Soviet threat in that time frame.

The six ships in this year's increment are estimated to cost \$506.8 million. The Total Obligational Authority (TOA) requested is \$459.5 million. The delivery schedule for these ships will be determined when the contract is awarded. We hope to fund this year's increment in the third quarter Fiscal Year 1971.

2 GENERAL PURPOSE AMPHIBIOUS ASSAULT SHIP (LHA)

The two ships in this year's program are the third increment of the nine ship LHA program which started with funding of one ship in Fiscal Year 1969. Two more ships were authorized and funded in the Fiscal 1970 program with advance funding for two more. The two ships in this year's program are estimated to cost \$302.0 million. We are requesting \$27.5 million advance funding for long lead time material for two more ships. The Total Obligational Authority (TOA) requested is \$313.5 million.

Present day amphibious operations require fast, versatile ships which can act quickly to transport and land troops and their essential equipment and supplies in assault operations. The LHA, and other newer amphibious ships procured in prior year programs, form the nucleus of our 20 knot amphibious force Each LHA will have the capability of carrying the major part of a Marine Battalion Landing Team and landing it in both over-the-beach and vertical lift assaults from a single ship.

Amphibious force levels by the end of Fiscal Year 1970 will support the lefting of 11/2 Marine Expenditionary Forces (MEF). It is the present Department of Navy plan to create an amphibious force level to support the lifting of 1% Marine Expeditionary Forces. If this capability is to be achieved by Fiscal Year [deleted] it is necessary to proceed with the construction contract for nine

The LHA will be the first ship to be developed through the Concept Formulation/Contract Definition process. Contract definition competition among three contractors led to an award of a multi-year production contract for nine ships on 1 May 1969 with Litton Industries. Funding of the second increment, the two Fiscal Year 1970 ships, was made on 15 November 1969. We hope to fund the two ships in this year's increment in November 1970. Delivery of ships in this increment should begin in the second quarter of Fiscal Year 1974.

2 OCEANOGRAPHIC RESEARCH SHIPS (AGOR)

We are requesting \$7.3 million for two oceanographic research ships this year. These are small ships of a basic commercial design which will be fitted with scientific equipment and allocated to the support of institutional research. Academic institutions provide the principal basic oceanographic research support for the Navy, primarily relevant to ASW. The Navy provides substantial resources including oceanographic ships for conducting this basic research effort. One of these two ships is planned for support of important work done by the University of Hawaii; the other for work done by Texas A&M University. These two ships will replace a converted World War II 180-foot Army island freighter and a converted 90-foot yacht.

The Navy's oceanographic ship construction program has been subjected to a 3-year interruption because of funding constraints. As a result, the ability of the academic institutions to support effectively the Naval Oceanographic Program has steadily diminished. At the same time, the annual operating and upkeep costs of the converted ships currently employed in oceanographic research have risen markedly. The ships to be replaced lack the essential features needed for a research platform and their configuration and weight limitations prohibit or severely restrict their use in taking advantage of the rapid advances being made

in marine technology.

Contract award of these two ships is planned for second quarter Fiscal Year 1971. Delivery is expected in the third quarter of Fiscal Year 1972.

Service Craft

\$15.6 million is requested this year for the procurement of service craft. The Navy has a large inventory of service craft, some 1500 in number. About 90% of these craft are of World War II vintage and almost all of them should be replaced. The craft requested in this year's program are 12 large harbor tugs and four non-self propelled fuel barges. All are replacements for craft over 25 years of age, which can no longer be maintained economically or perform their missions adequately.

Our budget requests in this and recent years have not included the number of service craft replacements that we know we need. This has happened because of fiscal pressures and our pressing need for new combatant ships. As we begin to get out heads above water we plan more emphasis on future procurements of these much needed service craft.

CONVERSIONS

6 FLEET BALLISTIC MISSILE SUBMARINE (SSBN)

The six POLARIS to POSEIDON conversions requested this year are a continuation of the conversion program begun in Fiscal Year 1968 to provide 31 of the fleet ballistic missile submarines with a POSEIDON missile capability. Eight of these conversions were approved and funded in the last three years. We believe these ships are vitally important to deterring a nuclear attack against the United States.

Principal considerations used in developing the POSEIDON conversion program schedule were (1) keeping the maximum number of ballistic missiles on the line at any one time in order to maintain a credible deterrent, (2) maximum utilization of nuclear core life and (3) shippard capacity.

The six ships requested for conversion this year also require refueling of their nuclear power plant. If conversions were not approved, an extended overhaul period, only one month shorter than the conversion period, would still be required for overhaul and refueling of these six ships. In this event, some subsequent off-the-line time for conversion to POSEHDON capability, with a commensurate reduction in strategic deterrence would be required when shippard work loading permits. During the period between near-term overhaul and a later POSEHDON conversion, these six ships would be limited to a POLARIS missile capability.

The POSEIDON missile test program results continue to be satisfactory. In a planned program [deleted] test flights, sixteen have been conducted to date. Eleven of these (68.7%) have successfully met test objectives. [Deleted] tests for this [deleted] will be [deleted] missile launches from the [deleted].

The six conversions in this year's program are estimated to cost \$436.0 million. The TOA requested is \$371.2 million. Contract award is planned for first quarter Fiscal Year 1971 and completion is expected to begin in the second quarter of Fiscal Year 1972.

4 GUIDED MISSILE FRIGATE (DLG)

These four conversions are a continuation of the guided missile frigate modernization program begun in Fiscal Year 1966. After these four conversions only five of the nineteen ships in the DLG-6 and DLG-16 classes remain to be modernized. This year's program includes one ship of the DLG 6 class and three of the DLG 16 class.

The modernization provides each class ship with the capability to launch either the Homing TERRIER or the STANDARD missile from the same launcher. We plan to replace the TERRIER missiles in these ships with the STANDARD missile as it becomes available in quantity.

These ships will also be equipped with the Navy Tactical Data System, an improved three dimensional air search radar the SPS 48, and the improved guided missile fire control system—the Mk 76. These changes will give the ships increased target acquisition range, markedly reduced reaction time and a greater kill probability.

We plan to award the contract for these four conversions in the first and second quarters of Fiscal Year 1971 and deliveries of the converted ships are expected to begin in the second quarter of Fiscal Year 1972. These four conversions are estimated to cost \$150.0 million. The Total Obligational Authority (TOA) requested is \$150.0 million.

5 OCEAN MINESWEEPERS (MSO)

Five conversions costing \$26.0 million are requested this year to continue the MSO modernization program begun in Fiscal Year 1968. Ten conversions were approved last year and we had intended to request ten more this year. However, to live within our budget we re-phased the program to only five ships in Fiscal Year 1970 and five this year.

The modernization provides new reliable engines and a variable depth sonar with significantly improved mine hunting and mine classification capability. Im-

provements in electronics, safety and habitability are also planned.

Contract awards is planned in the fourth quarter of Fiscal Year 1971 and deliveries are expected to begin in the third quarter of Fiscal Year 1973. The TOA requested is \$22.4 million.

This completes the Fiscal Year 1971 conversion program. I will next summarize other items in the budget for which authorization and funding are requested.

ADVANCE PROCUREMENT

Funds amounting to \$376 million are requested for advance procurement of long lead time equipment of future program ships. Requirements by ship type are tabulated as follows:

Nuclear attack aircraft carrier	\$152,000,000
Nuclear attack submarines	45, 000, 000
Nuclear guided missile frigates	
General purpose amphibious assault ships	27, 500, 000
Fleet ballistic missile submarine conversions	78, 800, 000
Guided missile frigate conversions	34, 200, 000
maka)	270,000,000

The advance funding for a carrier is for CVAN 70, the third carrier of the third carrier of the Nimitz class. If these funds are provided the Navy would request authorization and completion of funding for this ship in the Fiscal Year 1972 program.

The Navy considers that this third Nimitz class carrier is required if we are to maintain the capability and modernity of the carrier force in the future-regardless of its size. In fact, the Nimitz class carriers become even more important if the Navy is required to operate a smaller carrier force. If a reduction in force level is made, it should be done by retiring older carriers in the fleet.

NIMITZ CLASS CVAN PROPULSION SPARES

A third and final increment of funding in the amount of \$20.7 million is requested to provide long production time propulsion spares for the Nimitz class attack aircraft carriers.

OUTFITTING AND POST DELIVERY

Continuing the policy approved by you last year we are again requesting, as separate line items, funds for outfitting and post delivery costs for ships in prior year programs which will deliver in the near future. Outfitting material includes the initial supply of consumables and repair parts needed. Post delivery costs are those associated with work required to correct construction deficiencies defined during acceptance trials or during the shakedown period and which can be accomplished within eleven months following ship delivery.

A total of \$76.6 million is requested for outfitting and \$83.3 million for post delivery costs. This is an increase over the amount in the Fiscal Year 1970 budget, primarily because this year, a larger number of ships is completing construction and requires outfitting and post delivery availability.

CLAIMS AND OTHER COST GROWTH

We are requesting \$210.0 million for claims and other cost growth. These funds are to be applied toward the estimated \$812 million cost growth that has occurred in prior year shipbuilding programs. The growth is primarily the result of contractor claims, increased cost of ships being built or converted in naval shipyards and ship awards higher than planned because of unanticipated market conditions and inflation. Of the \$812 million, \$502 million has been

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funded to date leaving a surrent descience of \$210 million. We are requesting \$210 million of this amount in this year's budget, and plan for the remaining \$100 million to be funded in Fiscal Year 1972.

In summary, we are requesting 14 new construction ships and conversion of 15 existing ships. The total cost of this program, \$2546.1 million, less \$343.2 million advance funding from prior years, plus \$376.0 million advance funding for future ships comprises the requested Total Obligational Authority of \$2,578.9 million. None of these requested funds is for industrial facilities.

Mr. Chairman, this completes discussion of the Fiscal Year 1971 program. There is, however, one further matter to be discussed. The Defense Appropriation Act, 1970, requires that funds available from the Fscal Year 1967 and prior year programs which will be unobligated as of June 30, 1971 must be identified and proposed for rescission. It is estimated that \$150 million will remain unobligated on June 30, 1971, but these funds are still required and therefore re-authorization of this \$150 million is requested.

Completion of fifty-three ships of the Fiscal Year 1967 and prior year programs is planned during Fiscal Year 1971. Forty-three will remain under construction on June 30, 1971. The \$150 million will be used to close out the ship projects of the fifty-three ships delivering in Fiscal Year 1971 and to complete the forty-three

ships remaining under construction.

Mr. Chairman, this completes my statement.

Admiral Cousins. The new construction we are requesting consists of three nuclear attack submarines, the SSN 688 class. They are follow-on ships of the high-speed SSN 688 class. Procurement of this class was begun in the fiscal year 1970 program with the authorization and funding of three ships. In fiscal year 1970 advance funding for five future submarines was also provided. We had hoped to build five submarines this year but, in order to live within limited funds, this budget includes only three ships. The advance funding in fiscal year 1970 will be used to support the three ships in this year's program and [deleted] of the ships now planned for the fiscal year 1972 program. We are requesting this year \$45 million additional advance funding for [deleted] more shipsets of long leadtime materials, thus we will have sufficient advance funding to support [deleted] submarines in the fiscal year 1972 program. In the past we have pointed out that five nuclear attack submarines should be built each year; however we have not yet obtained approval for programs of this size. Transition of the total attack submarine force to nuclear propulsion is a basic and essential goal of ours.

Our cost estimate for the three attack submarines in the fiscal year 1971 program is \$498 million. The total obligational authority (TOA) request for these and the future submarine program is \$475.5 million. We plan to award the contract of these three ships in the third quarter of fiscal year 1971, as part of a multiyear procurement along with two

of the attack submarines in the fiscal year 1970 program.

Now, turning to the nuclear guided missile frigate, DLGN-38 class. The nuclear guided missile frigate, formerly known as the DXGN, is now designated the DLGN-38 class. The first ship of this class was authorized and funded in the 1970 program. The ship we are requesting this year will be the second and it will be called DLGN-39. An increment of advance funding for the second, third, and fourth ships of the class was requested in the 1970 program. Congress appropriated advance funding for these ships plus an additional \$10 million for a fifth ship of the class. Advance funding sought in this year's request will complete long leadtime material requirements of the third and fourth ships. We plan procurement of the [deleted] in fiscal year [deleted] the [deleted] in fiscal year [deleted].

The task group concept of naval operations requires the availability of guided-missile-equipped surface combatants to provide protection to other surface forces and to perform independent missions in the

face of enemy threats.

For both independent duty and task group operations, nuclear propulsion permits the commander to position his ships with much more flexibility, since they are not dependent on tankers to bring them fuel oil for support. The overall capabilities of a nuclear carrier task group are improved each time a nuclear-powered guided missile frigate is substituted for a conventional-powered guided missile ship. The all-nuclear carrier task group is the Navy's objective.

Considering total numbers of guided missile ships required in the fleet, and improved capability of task forces when all nuclear ships operate together, the Navy has developed a long-range program goal

for [deleted] DLGN-38-class ships.

The cost estimate for this year's ship is \$213.8 million. The total obligational authority (TOA) requested is \$221.3 million. Contract award is planned for third quarter fiscal year 1971 and delivery is expected in fiscal year [deleted].

SIX DESTROYERS (DD-963 CLASS)

The six ships requested this year are a continuation of the DD-963 program begun in fiscal year 1970. Last year Congress authorized eight of these ships and appropriated funds for five of them, with advance funding for long leadtime items for the next eight. Revised cost estimates, based on contractor proposed designs and current market conditions permit the procurement of only three ships, vice five, with the funds appropriated in fiscal year 1970. Contract award for the three to be procured with 1970 funds is planned this spring as the first increment of a 30-ship program. This approach is expected to provide us with effective destroyers at a minimum cost through the economies of series production and multiyear procurement, based on a strongly competitive design and bidding process.

As far as we can see into the future the Navy will require destroyers for offensive and defensive task group operations, including hunting and killing submarines, protecting naval and merchant ships from air attack, carrying out shore bombardment, and other amphibious warfare tasks. Even with a projected reduction in our destroyer forces over the next decade, and moving forward promptly with the DD-963 program a substantial number of our destroyer assets will still be 30 to 35 years old in 1980. These older ships will be no match for

the projected Soviet threat in that time frame.

The six ships in this year's increment are estimated to cost \$506.8 million. The total obligational authority (TOA) requested is \$459.5 million. The delivery schedule for these ships will be determined when the contract is awarded. We hope to fund this year's increment in the third quarter fiscal year 1971.

TWO GENERAL-PURPOSE AMPHIBIOUS ASSAULT SHIP (LHA)

The two ships in this year's program are the third increment of the nine-ship LHA program which started with funding of one ship in fisca' year 1969. Two more ships were authorized and funded in the

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fiscal 1970 program with advance funding for two more. The two ships in this year's program are estimated to cost \$302.0 million. We are requesting \$27.5 million advance funding for long leadtime material for two more ships. The total obligational authority (TOA) requested is \$313.5 million.

Present-day amphibious operations require fast, versatile ships which can act quickly to transport and land troops and their essential equipment and supplies in assault operations. The LHA, and other newer amphibious ships procured in prior year programs, form the nucleus of our 20 knot amphibious force. Each LHA will have the capability of carrying the major part of a Marine battalion landing team and landing it in both over-the-beach and vertical lift assault from a single ship.

Amphibious force levels by the end of fiscal year 1970 will support the lifting of 1½ Marine expeditionary forces (MEF). It is the present Department of Navy plan to create an amphibious force level to support the lifting of 1½ Marine expeditionary forces. If this capability is to be achieved by fiscal year [deleted] it is necessary to pro-

ceed with the construction contract for nine LHA's.

The LHA will be the first ship to be developed through the Concept Formulation/Contract Definition process. Contract definition competition among three contractors led to an award of a multiyear production contract for nine ships on May 1, 1969 with Litton Industries. Funding of the second increment, the two Fscal Year 1970 ships, was made on November 15, 1969. We hope to fund the two ships in this year's increment in November 1970. Delivery of ships in this increment should begin in the second quarter of Fiscal Year 1974.

TWO OCEANOGRAPHIC RESEARCH SHIPS (AGOR)

We are requesting \$7.3 million for two oceanographic research ships this year. These are small ships of a basic commercial design which will be fitted with scientific equipment and allocated to the support of institutional research. Academic institutions provide the principal basic oceanographic ships for conducting this basic research effort. One of these two ships is planned for support of important work done by the University of Hawaii; the other for work done by Texas A. & M. University. These two ships will replace a converted World War II 180-foot Army island freighter and a converted 90-foot yacht.

The Navy's oceanographic ship construction program has been subjected to a 3-year interruption because of funding constraints. As a result, the ability of the academic institutions to support effectively the Naval Oceanographic Program has steadily diminished. At the same time, the annual operating and upkeep costs of the converted ships currently employed in oceanographic research have risen markedly. The ships to be replaced lack the essential features needed for a research platform and their configuration and weight limitations prohibit or severely restrict their use in taking advantage of the rapid advances being made in marine technology.

Contract award of these two ships is planned for a second quarter fiscal year 1971. Delivery is expected in the third quarter of fiscal

year 1972.

SERVICE CRAFT

The sum of \$15.6 million is requested this year for the procurement of service craft. The Navy has a large inventory of service craft, some 1,500 in number. About 90 percent of these craft are of World War II vintage and almost all of them should be replaced right away. The craft requested in this year's program are 12 large harbor tugs and four nonself propelled fuel barges. All are replacement for craft over 25 years of age, which can no longer be maintained economically or perform their missions adequately.

Our budget requests in this and recent years have not included the number of service craft replacements that we know we need. This has happened because of fiscal pressures and our pressing need for new combatant ships. As we begin to get our heads above water we plan more emphasis on future procurements of these much needed

service craft.

CONVERSIONS

SIX FLEET BALLISTIC MISSILE SUBMARINE (SSBN)

The six POLARIS to POSEIDON conversions requested this year are a continuation of the conversion program begun in fiscal year 1968 to provide 31 of the fleet ballistic missile submarines with a POSEIDON missile capability. Eight of these conversions were approved and funded in the last 3 years. We believe these ships are vitally important in deterring a nuclear attack against the United States.

Principal considerations used in developing the POSEIDON conversion program schedule were (1) keeping the maximum number of ballistic missiles on the line at any one time in order to maintain a credible deterrent (2) maximum utilization of nuclear core life and

(3) shipyard capacity.

The six ships requested for conversion this year also require refueling of their nuclear power plant. If conversions were not approved, an extended overhaul period, only 1 month shorter than the conversion period, would still be required for overhaul and refueling of these six ships. In this event, some subsequent off-the-line time for conversion to POSEIDON capability, with commensurate reduction in strategic deterrence would be required when shipyard work loading permits. During the period between a near-term overhaul and a later POSEIDON conversion, these six ships would be limited to a POLARIS missile capability.

The POSEIDON missile test program results continue to be satisfactory. In a planned program of [deleted] test flights, 16 have been conducted to date. Eleven of these (68.7 percent) have successfully met test objectives. [Deleted] tests scheduled for this [deleted] will

be [deleted] missile launches from the [deleted].

The six conversions in this year's program are estimated to cost \$436 million. The TOA requested is \$371.2 million. Contract award is planned for first quarter fiscal year 1971 and completion is expected to begin in the second quarter of fiscal year 1972.

FOUR GUIDED MISSILE FRIGATE (DLG)

These four conversions are a continuation of the guided missile frigate modernization program begun in Fiscal Year 1966. After these four conversions only five of the 19 ships in the DLG 6 and DLG 16 classes remain to be modernized. This year's program includes one ship of the DLG 6 class and three of the DLG 16 class.

The modernization provides each class ship with the capability to launch either the Homing TERRIER or the STANDARD missile from the same launcher. We plan to replace the TERRIER missiles in these ships with the STANDARD missile as it becomes available

in quantity.

These ships will also be equipped with the Navy Tactical Data System, an improved three dimensional air search radar the SPS 48, and the improved guided missile fire control system—the Mk 76. These changes will give the ships increased target acquisition range, markedly reduced reaction time and a greater kill probability.

We plan to award the contract for these four conversions in the first and second quarters of Fiscal Year 1971 and deliveries of the converted ships are expected to begin in the second quarter of Fiscal Year 1972. These four conversions are estimated to cost \$150 million. The Total Obligational Authority (TOA) requested is \$150 million.

FIVE OCEAN MINESWEEPERS (MSO)

Five conversions costing \$26 million are requested this year to continue the MSO modernization program begun in Fiscal Year 1968. Ten conversions were approved last year and we had intended to request 10 more this year. However, to live within our budget we rephased the program to only five ships in Fiscal Year 1970 and five this year.

The modernization provides new reliable engines and a variable depth sonar with significantly improved mine hunting and mine classification capability. Improvements in electronics, safety and

habitability are also planned.

Contract award is planned in the fourth quarter of Fiscal Year 1971 and deliveries are expected to begin in the third quarter of

Fiscal Year 1973. The TOA requested is \$22.4 million.

This completes the Fiscal Year 1971 conversion program. I will next summarize other items in the budget for which authorization and funding are requested.

ADVANCE PROCUREMENT

Funds amounting to \$376 million are requested for advance procurement of long lead time equipment of future program ships. Requirements by ship type are tabulated as follows:

\$152 million for a nuclear attack aircraft carrier, the Nimitz-3.

\$45 million for nuclear attack submarines.

\$38.5 million for nuclear guided missile frigates.

\$27.5 million for general purpose amphibious assault ships. \$78.8 million for fleet ballistic missile submarine conversions.

\$34.2 million for guided missile frigate conversions. A total of \$376 million.

The advance funding for a carrier is for CVAN 70, the third carrier of the *Nimitz* class. If these funds are provided the Navy would request authorization and completion of funding for this ship in the

Fiscal Year 1972 program.

The Navy considers that this third Nimitz class carrier is required if we are to maintain the capability and modernity of the carrier force in the future—regardless of its size. In fact, the Nimitz class carriers become even more important if the Navy is required to operate a smaller carrier force. If a reduction in force level is made, it should be done by retiring older carriers in the fleet.

NIMITZ CLASS CVAN PROPULSION SPARES

A third and final increment of funding in the amount of \$20.7 million is requested to provide long production time propulsion spares for the *Nimitz* class attack aircraft carriers.

OUTFITTING AND POST DELIVERY

Continuing the policy approved by you last year we are again requesting, as separate line items, funds for outfitting and post delivery costs for ships in prior year programs which will deliver in the near future. Outfitting material includes the initial supply of consumables and repair parts needed. Post delivery costs are those associated with work required to correct construction deficiencies defined during acceptance trials or during the shakedown period and which can be accomplished within 11 months following ship delivery.

A total of \$76.6 million is requested for outfitting and \$83.3 million for post delivery costs. This is an increase over the amount in the fiscal year 1970 budget, primarily because this year, a larger number of ships is completing construction and requires outfitting and post de-

livery availability.

CLAIMS AND OTHER COST GROWTH

We are requesting \$210 million for claims and other cost growth. These funds are to be applied toward the estimated \$812 million cost growth that has occurred in prior year shipbuilding programs. The growth is primarily the result of contractor claims, increased cost of ships being built or converted in naval shippards and ship awards higher than planned because of unanticipated market conditions and inflation. Of the \$812 million, \$502 million has been funded to date leaving a current deficiency of \$310 million. We are requesting \$210 million of this amount in this year's budget, and plan for the remaining \$100 million to be funded in fiscal year 1972.

In summary, we are requesting 14 new construction ships and conversion of 15 existing ships. The total cost of this program, \$2,546.1 million, less \$343.2 million advance funding from prior years, plus \$376 million advance funding for future ships comprises the requested total obligational authority of \$2,578.9 million. None of these requested

funds is for industrial facilities.

Mr. Chairman, this completes discussion of the fiscal year 1971 program. There is, however, one further matter to be discussed. The Defense Appropriation Act, 1970, requires that funds available from the

fiscal year 1967 and prior year programs which will be unobligated as of June 30, 1971 must be identified and proposed for rescission. It is estimated that \$150 million will remain unobligated on June 30, 1971, but these funds are still required and therefore reauthorization of this

\$150 million is requested.

Completion of 53 ships of the fiscal year 1967 and prior year programs is planned during fiscal year 1971. Forty-three will remain under construction on June 30, 1971. The \$150 million will be used to close out the ship projects of the 53 ships delivering in fiscal year 1971 and to complete the 43 ships remaining under construction.

I appreciate your allowing me to read it.

GUIDED MISSILE FRIGATE CONSTRUCTION PLANS

Chairman Stennis. Yes; I enjoyed going through it with you and listening to you.

Do you have any further statements from anyone with you?

Admiral Cousins. No, sir.

Chairman Stennis. Admiral, we have some questions here now.

First, this DLGN-38 guided missile frigate, you issue a request for proposal on the frigate funded in 1970 to Newport News. Are they the only yard that is interested in building this ship?

Admiral Sonenshein. Yes, sir; that's the only yard that is quali-

fied and capable of designing and building the lead ship.

Chairman Stennis. When do you expect this contract to be awarded

for the $1970 \sinh ?$

Admiral Sonenshein. We expected to award this contract by December 1970.

Chairman Stennis. These awards haven't been affected by the President's recently lifted more torium on construction

dent's recently lifted moratorium on construction.

Admiral Gappis. The moratorium was for military construction, Mr. Chairman, not for this area of ship construction.

Chairman Stennis. None of these ships were included.

Admiral Sonenshein. No, sir.

FUTURE CONSTRUCTION

Chairman Stennis. What are your present plans now for the build-

ing of subsequent ships of this class?

Admiral Sonenshein. Our present plans are to build follow-on ships in the subsequent years in Newport News, and we are also considering developing a capability for this at the Puget Sound Naval Shipyard which is a shipyard on the West Coast, of course, that is now capable of doing nuclear overhaul work for submarines. Our long-range planning is to develop that yard for nuclear surface ships as well. Ultimately it will be support yard on the West Coast for nuclear powered aircraft carriers.

Chairman Stennis. Support yard? Admiral Sonenshein. For repairs.

PRESENT CONTRACT SCHEDULE

Chairman Stennis. So you are going to let this contract in the latter part of 1970. Does that mean the design and technical data is already complete?

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Admiral Sonenshein. The contract plans and specifications have been completed, and a request for proposals has been given to the Newport News Shipbuilding & Drydock Corp. We are presently in the process of awaiting its response which we expect this summer for the cost to construct. We will also conduct negotiations with them on the price and ship features, so that by the time we reach December 1970, we should have a specific work package at which time we should be able to contract. We are substantially there now, by having completed the contract plans and specifications and giving them to the contractor for study. Between now and then, refinements in scope and features will be developed.

COST INCREASE IF DEFERRED

Chairman Stennis. How much added cost would be incurred if this

1971 request is deferred? Do you have any idea on that?

Admiral Sonenshein. Well, our market prices go up, you know, sir, about on the order of 6 percent a year on labor and material. At least that has been the experience in the last year or so. So we could expect an increase of that order in that period, and perhaps other factors in the market would also affect it, but I couldn't speculate on that, sir.

Chairman STENNIS. Well, frankly I don't blame you for not wanting to put dollar figures down because they haunt you later, but it seems like you could give us some idea now. We may want to defer some of the items, though I don't say we will, but we would like to have something in the record from you about the dollar amount of possible costs that might be added.

Admiral Sonenshein. Yes, sir. (The information follows:)

Current delivery schedule of the first four ships of the DLGN 38 class is [deleted] and is based on ship and long leadtime funding as currently shown in the FYDP. This schedule is designed to meet fleet requirements at least cost. If the FY 1971 funds for DLGN 39 were deferred there would be a minimum delay of one year in the delivery of the DLGN 39 with a corresponding delay of one year or more in the follow ships. Deferred funding of DLGN 39 and the consequent delay in delivery can be expected to result in increased cost of approximately \$17M for DLGN 39 including \$11M increase in the cost of ship construction due to escalation, and \$6M increase for government furnished equipment and components due to escalation, smaller quantity buys, and redesign to accommodate the loss of standardization.

Advance procurement funds in the amount of \$5M for fire control systems for the fourth ship and \$33.5M for the balance of the funding for nuclear components including reactor cores for the third and fourth ships are requested in FY 1971. Deferral of these advance procurement funds would result in delays to the third and fourth ships. The Atomic Energy Commission plans to procure four shipsets of reactor cores for the first four ships of this class on a multi-year basis in FY 1970 in order to provide these reactor cores at minimum cost and on a series production schedule which supports the original ship schedules. Most of the \$33.5M for nuclear components for the third and fourth is required in FY 1971 in order to include the cores for these ships in the FY 1970 multi-year buy. The remainder is needed in FY 1971 to complete the funding for nuclear reactor components for the third and fourth ships in a series production sequence with the components for the first two ships.

Failure to provide the \$38.5M advance procurement funds in FY 1971 for the third and fourth ships would result in disruption of the series production lines, and delay the delivery of the third and fourth ships by about 6 and 12 months respectively. The disruption and delay can be expected to increase the cost of the

two ships on the order of \$10 to \$20M.

In summary, then, with respect to cost impact deferral of funding for DLGN 39 can be expected to increase the estimated cost of this ship by approximately \$17M. Further, failure to provide the \$38.5M additional advance procurement funding being requested in FY 1971 for DLGN's 40 and 41 can be expected to

increase the cost of these ships in the range of \$10 to \$20M.

Even with the present schedules for the first four ships of the DLGN 38 class, the *Enterprise* will have been at sea [deleted] years before the first full all-nuclear task group is available and the *Nimitz* will have been at sea several years before the second all-nuclear task group is achieved. By that time, the *Eisenhower* will be at sea with no additional nuclear-powered, guided-missile ships available to accompany her. The fifth ship of the DLGN 38 class for which Congress appropriated \$10M per procurement of long lead time items in FY 70 will be the first nuclear frigate available to accompany the *Eisenhower* and is expected to be completed about [deleted] years after the *Eisenhower*.

INCREASING COST OF DESTROYER

Chairman STENNIS. Well, now, turning to the DD-963, last year the average cost of these ships as submitted was \$68 million, an increase of \$33 million over the initial estimate for this year. To-day's cost is estimated at about \$83 million.

Now, is this \$83 million a target or ceiling price? Admiral Sonenshein. That is target price, sir. Chairman Stennis. Well, what is the ceiling price?

Admiral Sonenshein. Mr. Chairman, we are in the midst of negotiations with two contractors at the present time—Litton Industries and Bath Iron Works—and the ceiling price is one of the elements

to be negotiated, sir.

Admiral Gaddis. Additionally, Mr. Chairman, I think it is worthy to note in the record that unlike some, shall we say, smaller unit weapon systems, we are now budgeting our ships essentially on a learning curve.

Chairman STENNIS. On what?

Admiral Gaddis. We price our ships on a learning curve. The early ships of a class obviously will cost more than later ships in a class after we have made more of the same types. Therefore the price in a specific budget is not specifically related to such an average figure as the \$83 million target.

Chairman Stennis. Well, certainly this is a good illustration of how unrealistic these figures can get. This question says that last year the average cost was estimated at \$68 million which was already an increase of \$33 million over the initial figure. Is that correct?

Admiral Cousins. I think we should point out, as Admiral Moorer I know has done in the past, that the \$35 million figure was an out-of-the-hat estimate made by, I believe, OSD officials who said you ought to be able to buy a destroyer for about that much. It represented no more definitive engineering work than that. It was—Admiral Moorer called it—a visceral feeling of what it might cost. I think the true increase more properly certainly starts from the \$68 million figure.

Admiral Sonenshein. Yes, sir. I think it is important to note also, and I think it has been made clear in the record, in prior years, that this ship is being acquired by a process different than has been conventional. We are now going through a process of competitive contract definition and, until the contract definition procedure is completed, we are talking in terms of estimates, of an notional ship. It

will not be until the negotiations are completed on this competition in April or May of this year that the price will be known. I think we are doing a service to the taxpayer here, by determining in advance as best we can with our human faculties what will be the price of the procurement before we start rather than post facto.

Chairman Stennis. Well, that is very good and I agree to that and

I commend you for it, too.

I am not worrying about the insides of these ships, whether it is properly put together and all. I am worried about getting the money to build them. So we emphasize different things.

True, it was an estimate but once you put that figure on there, then it is gone with the wind and in a few minutes there is news about the

so-called overrun.

Admiral Sonenshein. We haven't had a contract yet.

CONTRACT OVERRUNS

Chairman Stennis. You say you haven't even had a contract, and yet the news is that you have close to 100 percent overrun already.

Now, it seems to me like you gentlemen with all your skill and learning have just got to learn how to stay out of those traps and pitfalls like that for us if for no other reason, so we can justify the money for the items that we decide you need.

Admiral Cousins. Well, we are really between a rock and a hard place. If we come in with what we think is probably the ultimate price, the contractor immediately somehow becomes aware of that and that then becomes the starting price for new negotiations, I am afraid.

Chairman Stennis. Yes; that is right. Well, I have learned my lesson about it. As a member of the committee I used to insist that you give some kind of a figure to start with, and I think the whole committee did. But I have learned better. I have changed my mind because it is so unrealistic. The Congress is up against a problem, too. They have got to have some concept of what it is going to cost, but these estimates on the \$35 million were made as recently as calendar year 1967, weren't they?

Admiral Sonenshein. 1967.

Chairman Stennis. This is just 3 years later and it already is \$68

million and no contract let yet.

Admiral Sonenshein. The Congress appropriated certain moneys, in the order of \$30 million, to carry out this process of contract definition to determine what the ship would be like and what would be the price. It has taken over 2 years to do that.

Chairman Stennis. Yes, I know, but the same problem exists now for us and you wait until the figures for these ships that have these so-called overruns hit the floor and they will be attacked. The person who has gone into it understands how it happens better than the average Senator not on the committee.

You have \$210 million in here now to cover the so-called cost growth claims. That is a little better word, cost growth. Now, where do they fit in? What is it going to be used for, Admiral? Give us a bill of next involves on that

particulars on that.

Admiral Sonenshein. Yes, sir. You know we have had a deficit in the SCN account which Admiral Cousins describes as approaching

\$812 million. It has been liquidated to a considerable extent to where it is now \$310 million through a combination of ship deferrals and some additional obligational authority that the Congress has made available. It is our goal to completely liquidate that deficit by 1972.

Now, a portion of that deficit, something in the order of \$420 million at the present time, is represented by claims from shipbuilders. We have a complete program for the disposal of those claims. Each of the major claims, and there are some 28 on hand, is being addressed by a special team of contract negotiators, engineers, and legal experts. Each of the claims has been scheduled for disposition with specific milestones for technical surveys, legal entitlement determinations, and final offers to be made. Under our present plans we should reach a position of disposing of the major claims insofar as the Government is concerned for the end of this calendar year.

Now, this doesn't mean that the claims will necessarily be settled finally by our action. If our offers are accepted by the contractors, then they will in fact be settled. If they are not accepted, then we will have to go into litigation. We are being most careful in carrying out our claims settlement program to develop a full set of facts for each of these claims before making an offer of payment so that, if in fact we do go into litigation, we will have a sound legal basis for subsequent

action.

But I do believe that by the end of this year, and our schedule is so proceeding, we should be in a position to make a contracting officer's determination on each of the major claims. When they will be finally settled and paid will remain to be seen, however. It depends on the reaction of the claimants.

CLAIM SETTLEMENTS

Chairman Stennis. Well, has this claim matter been going on all

these years?

Admiral Cousins. Admiral Moorer likes to point out that these claims go back over a 12-year period, apply to some 130 ships, and are relatively a small part of a \$23 billion shipbuilding program dur-

ing those years.

Admiral Sonenshein. Yes. I think that is a very pertinent point. As long as we have contractual dealings, we will always have claims. In fact, I think I can almost say that without reservation. However, our level of claims in prior years, going back 15 years ago, 10 years ago, has been relatively modest, you might say a normal fallout for the large amount of contracting business being carried out.

However, in the last 2 years we have had an unusual volume that has been precipitated, I believe, by conditions going back at least 7 or 8 years. There are basically a few conditions I think that have

generated this.

BACKGROUND OF PRIOR CLAIMS

Chairman Stennis. What were they so different from prior years? We have had inflation before.

Admiral Sonenshein. Well, sir; I will try to summarize quickly. In the last 7 years under the guidance of the Secretary of Defense who was then in office, we emphasized firm fixed price competitive contracts. This had a tendency to push the bidders into low bidding

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positions, so-called buy-in's. Market conditions were conducive to this. Also, we had an inflationary economy come upon us that took off rather rapidly in 1965, more rapidly than we had estimated would occur. Further, we had difficulties in our own management. We had deficiencies in our own management of the program where our specifications, our advanced planning, our monitorship within the Navy, was not all that it should be, and this combination of circumstances all contributed to the current claim situation.

Chairman Stennis. You mean it was the severity of the specifications that had been reduced too much that paved the way for these

dd-ons?

Admiral Sonenshein. In some cases; yes, sir. In some cases where the specifications were too demanding for the state of the art or not precisely drafted. We also had situations where Government furnished material was not delivered on time to the shipbuilder or delivered with deficiencies in it. All these things taken together have contributed to the deficit that we described earlier.

Chairman STENNIS. Well, it is quite a problem, but-

Admiral Cousins. I think I should say-

Chairman Stennis. It is hard for the public to understand it. It is hard for me to understand it much less explain it to someone else in debate. I have said many times publicly and privately whatever else may be the matter in the Pentagon, every taxpayer can rest assured he is well represented at the negotiation table, getting a dollar plus in value for every dollar spent. I thought that was the Secretary of Defense's strong point.

I am not one to try to kick anyone in the back but I am amazed at what we found out has been going on. The gentlemen who represented the Navy in those years must have known what was happening and that these claims were building up. You say these are claims. What is

a claim? Give us some illustrations, some definition.

Admiral Sonenshein. Well, a claim is an allegation, in effect, by the contractor that in some respect the Government has not fulfilled its contract or its part of the contract and has caused him extra expense for which he should be reimbursed. That is the essence of it.

Now, the claim picture was recognized—the cost growth picture in the shipbuilding industry—was recognized as early as 1967 in the Navy but its full proportions were not appreciated. It was detected as starting to occur as early as that and with the submittal of a very large claim that was generated on the west coast by the Todd Shipbuilding Corp. in constructing destroyer escorts. That was the first major indication that this had occurred. Subsequently we have had others of a similar nature from other major shipbuilders primarily in the surface ship category for those types where there had been very tight competition for shipbuilding contracts.

This condition obtained for certain ships, the DE's, the LPD's, and other surface ships that were very fiercely fought for in the market

conditions that then prevailed.

Chairman STENNIS. I would think you had to make some allowances for what I would call add-ons or alterations that could run that price up, but this stiff competition you talk about didn't lead to a firm contract with an actual ceiling on it.

Admiral Sonenshein. Yes, sir; it led to firm fixed-price contracts and the claims are for moneys in excess of those firm fixed-price contracts. That is the nature of the claim.

Chairman STENNIS. Well, it must be found somewhere in the terms

of the contract, must it not? Otherwise it cannot be established.

Admiral Sonenshein. That is right, sir. The allegation states there

has been a breach of the contract in one degree or another in certain respects, and then it is our job to analyze that and agree to determine

its validity.

I would like to say, Mr. Chairman, that while I have stated that the claims that we have approach some \$500 million, it doesn't mean the Navy is going to pay \$500 million or offer to pay \$500 million. Our analyses are not yet completed. They will be complete in the next several months, and I think in some cases our determination will be for substantially less than has been alleged by the contractors, but I don't want to prejudge the results of those analyses.

Chairman STENNIS. I can see where certain matters arise, a ship about a third finished, that matters arise that you can't agree on readily. It is not practical for you or the contractor either to say, "Well, we will just stop this construction until we can agree on this claim." That

is not practical. So you have to keep going, do you not?

Admiral Sonenshein. Yes, sir. That is another very valid point.
Admiral Gaddis. Stopping construction of itself can result in a claim, sir.

Admiral Sonenshein. When we are building ships we really can't stop part way. When you are building airplanes or main battle tanks or missiles and you run into financial problems, the quantity can be reduced, but in our shipbuilding contracts that is not normally a

feasible alternative.

Chairman Stennis. Take this C-5A contract. Everyone seems to agree that the contractor didn't make any money out of it, no excess profits, no profit at all. Even the Air Force said they didn't make any money. And no one claims that anyone stole any money or made away with it. And it was a good product, apparently. So it is not a fault of theirs. Still it turns up here costing the Government all this extra money, and I just cannot understand how that happened, unless it was just a buy-in price that most everyone must have known or had strong reason to believe was out of line and wouldn't do the job.

I am not asking you to agree on that. I don't say that as a fact. But I don't know. But I also think that there must be a lot of contracts where an item costs a lot of money, and the Government had to pay all that sum but it wasn't recognized as an overrun. Different kinds

of contracts.

Admiral Sonenshein. Yes.

Chairman Stennis. And put high enough to start this to cover the cost of production anyway. What about that? Speak up on that.

Admiral Gaddis. I think there is another factor here also, Mr. Chairman, which might apply in the C-5A case as I am sure it applies in the case of some of the shipbuilding claims. That is that favorable claims decisions in the very recent years have encouraged companies to submit claims that otherwise would not have been submitted and to change the size of claims they have submitted.

Admiral Sonenshein. That is why, Mr. Chairman, we have attacked these shipbuilding claims so vigorously, and why we are not giving a penny that isn't substantiated with complete documentation and support to be a valid and proper one. We don't intend to just roll over backwards on these claims.

Chairman Stennis. Good. Well, I wanted to get your responses to that problem and it is a problem. I am not saying where the wrong is—

Lockheed or the Air Force.

We have a matter here now on our doorstep that you are leaving with us, this carrier 68. It was developed this morning that we do not yet know the cost of it.

Admiral Sonenshein. I didn't hear the testimony this morning,

Mr. Chairman, but—

Chairman STENNIS. Sixty-eight, 69, no determination yet what it is going to cost. So speak to that, will you, please?

Admiral Sonenshein. Yes, sir, I will be happy to.

CVAN 68 is under construction at the Newport News Shipbuilding & Dry Dock Co. It is approximately 35 percent completed. The work is progressing under a letter contract previously awarded. We have been actively engaged with Newport News Shipbuilding & Dry Dock Corp. over the past several months in definitizing the cost of that contract into a fixed price incentive type contract.

The negotiations are right in the middle of their course at the present time. The current estimate for this ship is \$536 million. The original budget estimate was prepared on the basis of fiscal year 1967 dollars. We are carrying out our negotiations from that base. The contract has clauses in it that provide a formula for escalation to be calculated and

predicted through the course of the construction.

The allowance for escalation that we were permitted to include when we made our budget estimate was 7.5 percent for the life of the ship construction project. This year's program which Admiral Cousins has presented, has in it 10 percent allowance for escalation for the projects that are in this year's program. Now it appears, therefore, that if the economy continues as it has in the last few years, we will be short of funds, particularly to reflect that deficiency in escalation. So at the present time we are negotiating a contract—we have not yet reached a price yet—with the contractor.

We know pretty well that we are short in that one category that I described, the escalation. But I do believe that within a month or so we will in fact be able to tell the Congress what is the target price negotiated and then be able to determine where we stand. But at the

present time we are not in a position to do that.

With regard to the second carrier, the CVAN-69, the negotiation for that must follow the first one and will be dependent on the results of that. We will be able to tell that within a few months also.

Chairman Stenins. So within 30 to 60 days you expect to get us

a final figure on 68?

Admiral Sonenshein. No, sir. We have a few other problems that may prevent us from achieving that. I will just mention them without belaboring them. One is that the Newport News Shipbuilding and Dry Dock Corp. has been found to be in noncompliance with the Equal Employment Opportunities Act, and so therefore until——

Chairman STENNIS. They are in bad trouble, then.

Admiral Sonenshein. Until that obstacle is removed, we could not consummate a contract anyhow, but we are hopeful that it will be removed.

Chairman Stennis. Well, you tell me how you got it done if you get it removed.

And then some time thereafter you will get in the 69.

Admiral Sonenshein. Yes. (The information follows:)

The major portion of the cost of the Nimitz and the Eisenhower is the shipbuilder's price for procurement of material and construction of the ships. The Navy is currently negotiating a fixed price incentive fee type contract with the shipbuilder; this will establish target and ceiling prices for these two ships. The Navy anticipates that the target prices for the two ships based on FY 1967 shipbuilding labor rates and material prices will fall within the amount allowed for the shipbuilding contract in the budget estimates cited above. If the Navy is not successful in negotiating target prices within the present budget

estimate, the budget estimate will have to be revised at that time.

However, even when negotations are completed and the contract terms and pricing arrangements are settled the Navy will still not be able to predict the ultimate end cost with accuracy until actual ship construction is considerably advanced. This is so because there are many uncertainties involved in constructing these complex warships, and it is not possible to know in advance exactly how much effort will be required to build them. It is for these reasons that a fixed price incentive fee type contract is used for this type of work. This type contract contains an incentive sharing arrangement where the Government pays a large part of the costs should they exceed the target cost. Therefore, the Navy's liability under this type contract may exceed the target prices.

Chairman STENNIS. This 68 is only one-third completed? Admiral Sonenshein. Yes, sir.

ATTACK SUBMARINE DESIGN

Chairman Stennis. Well, now, going over to the attack submarines, SSN 688 class, the Navy was given \$35 million in 1969 for advanced procurement. The first three ships were authorized and funded in the 1970 program. Now, who is designing these submarines?
Admiral Sonenshein. The Newport News Shipbuilding & Dry

Dock Corp. is designing the SSN 688 class.

Chairman STENNIS. Have you awarded contracts for detailed de-

sign and working plans yet?

Admiral Sonenshein. Yes, sir. We have awarded a contract to Newport News for the detail design of the SSN 688 class. We expect to consummate a contract for construction of the SSN 688 in about the third quarter of this year.

We also have to eliminate the obstacle created by the equal employ-

ment opportunity problem.

Chairman Stennis. So you get that done during the third quarter, you are expecting now, at least, to get the contract, get the design completed and the contract let.

Admiral Sonenshein. Yes, sir. The contract design is completed.

What we need to do is let a contract for the construction.

Chairman Stennis. Well, I judge from what you said about Newport News you are expecting them to build this first ship.

Admiral Sonenshein. Yes, sir.

Chairman Stennis. But, of course, no contract made. Well, is there any overrun yet on it?

Admiral Sonenshein. No, sir.

Chairman STENNIS. All right. That is fine.

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USE OF CIVILIAN LAWYERS

By the way, before we get away from those overruns on the contracts for carriers, I am a lawyer and I wondered what legal talent do you use, gentlemen, in making these contracts? Civilian lawyers or in uniform?

Admiral Sonenshein. They are civilian lawyers. In the Navy Department we have the Office of General Counsel and he is the professional boss of all the Navy's civilian counsel. Within the Naval Ship Systems Command and involved directly in developing these shipbuilding contracts and other related matters such as settling claims, we have some 25 civilian counsel who are specialists in various—in this kind of work.

Chairman Stennis. Well, the General Counsel is a civilian, too.

Admiral Sonenshein. Yes, sir.

Chairman Stennis. Under your employment.

Admiral Sonenshein. No, sir. He reports to the Secretary of the

Navy, the Office of General Counsel.

Admiral Gaddis. Each procuring manager in the Navy Department has his counsel who works directly for him. All those counsel in the Navy are guided by policy set by the General Counsel of the Navy who reports only to the Secretary. In essence you have this legal channel directly responsive to the Secretary's requirements.

Chairman Stennis. He is stationed in or near the Pentagon, I

suppose.

Admiral Gaddis. Yes, sir.

Chairman Stennis. In proximity to the Secretary.

Admiral Gaddis. Yes, sir.

Chairman Stennis. Well, he carries a big responsibility, tremendous responsibility. All these contracts and the other contracts the Navy has, he is responsible for those?

Admiral Sonenshein. Yes, sir. For the legal aspects. But each of

Admiral Gaddis. They are more directly under the specific responsibility of the Chief Counsel of the Ship Systems Command who works

directly for Admiral Sonenshein.

Admiral Sonenshein. Mr. Chairman, let me elaborate further. I have, as does every other Systems Commander who is involved in major procurement, a large contracting division. In fact, I have some 220 people involved in negotiating contracts of all the kinds of procurements for which I am responsible. The 25 lawyers that work with the Contracting Division on the legal aspects of the contractual business that goes on. It is a big operation, sir.

Chairman STENNIS. Yes. Does each new administration bring in

a new man to head up——

Admiral Sonenshein. Mr. Steger, the General Counsel, has been in

that position for quite a few years to my knowledge.

Admiral Gaddis. It is the prerogative of a new Secretary to hire his own General Counsel. It has been customary in the Navy that a completely satisfactory General Counsel in good health has normally succeeded through administrations and Mr. Steger, the present General Counsel, has served under, if I recall correctly, five Secretaries.

Chairman Stennis. Well, if you have him here today I want him

to hold up his hand, anyone who has served under five Secretaries.

Admiral Gaddis. He is not here.

Chairman Stennis. I am glad to get to know more about that.

The gentlemen in uniform, the Judge Advocates General, they don't handle this all——

Admiral Gaddis. He handles military law.

ANTICIPATED SUBMARINE COMPLETIONS

Chairman STENNIS. All right. Back to this submarine now. I believe you have already covered when you are going to get that contract. When do you expect fabrication on the lead ship to begin? When will it be completed? Give us some information on ships two through six.

Admiral Sonenshein. The lead ship will be completed by [deleted]. The second ship will be completed in [deleted] and the remaining ships will be completed at approximately [deleted] month intervals.

Chairman Stennis. Are these the superfast submarines?

Admiral Cousins. Yes, sir.

Chairman STENNIS. Do these schedules assume a brickbat priority? Admiral Cousins. We have had considerable discussions with OSD about brickbat priority and a recommendation was recently made by OSD to the President for that we would get partial brickbat priority, sir, for the critical items for the lead ship only.

Chairman Stennis. I was going to ask you how you could get

partial priority. That is for certain lines.

Admiral Cousins. Yes, sir.

Chairman Stennis. Have you been given that or just—

Admiral Cousins. We have been told that we will get it on the critical items we need it for, sir.

Chairman STENNIS. On the SSN class, SSN-671, how long did it

take to build it?

Admiral Cousins. SSN-671 was contracted for on July 28, 1964. Actual construction began on March 15, 1965, and the ship was commissioned July 12, 1969—a construction period of 52 months.

Chairman Stennis. How does it compare with the SSN-688 we have

been talking about, in size and complexity?

Admiral Cousins. The SSN-688 is larger and more complex than the SSN-671.

Chairman Stennis. Newport News has been awarded a contract to build two SSN's follow-on 637 class. Now, what is the delivery schedule of these ships relative to delivery of the lead ship SSN-688?

Admiral Cousins. I think we will have to provide that for you.

Chairman Stennis. All right. And what would be their delivery period?

(The information follows:)

The SSN 686 is expected to complete in [deleted] and the SSN 687 is expected to complete in [deleted]. The SSN 688 is expected to complete in [deleted].

Chairman STENNIS. All right.

Admiral Cousins. I think as you know, sir, that other shipyards will be allowed and are expected to bid on the follow-on 688 class: that is, 689 and subsequent, in lots of perhaps two or three. We hope to get some savings there from multiple procurement programs.

The 1971 budget estimate of \$498 million was based on a unit price of \$166 million which was estimated by the Navy for each of four

fiscal year 1971 SSN's. The reduction from four to three SSN's raises the estimated unit price from \$166 million to \$169.3 million and his increased unit price was not included in the fiscal 1971 budget.

Mr. Chairman, may we just briefly let you know how concerned we are about the cost growth problem. We know how much concern it is to you and the trouble and embarrassment it causes to you and us both. There is nothing that we are working on any harder than that today. Mr. Laird and Mr. Packard and CNO spend a great deal of time on this problem. Admiral Sonenshein would like to tell you briefly what he is doing in the Ship Systems Command to get hold of this problem.

Chairman Stennis. I am glad to have it for the record, so go ahead

and make your statement.

Admiral Sonenshein. Starting in August of 1968 and completing in April of 1969 the Navy Department launched a very intensive study of its own management of this program. The study was called the SCN Pricing and Cost Control Study. I was chairman of that effort. It happens that Admiral Gaddis who is sitting on my right was also a valuable member of the steering group of that very large

undertaking.

We brought together people from the entire Department who had an interest in the shipbuilding program, had a responsibility in some aspect or another—it went beyond just Naval Ship Command. It involved Naval Operations, the Naval Material Command, the Naval Ordnance Systems Command, and others. We brought together all the talent we could to study the entire management of this program, and we developed a comprehensive report, some seven volumes. It contained some 83 recommendations. It was a self-analysis, a very critical self-analysis.

Those recommendations were reviewed all the way up through the Secretary of the Navy and were substantially approved for im-

plementation.

Just a matter of a month ago, I believe it was on the 20th of January, Admiral Moorer approved a program that evolved from these recommendations that is called the Shipbuilding and Conversion Improvement Program. I am charged with managing that and carrying out the specifics that have been laid out in that program for strengthening our management of the shipbuilding program within the Navy Department. I am happy to report that each of these specific projects, which number some 120, has been delineated in detail, and a schedule of milestones has developed for carrying it out. Responsible officials have been appointed for each of those items and we are making good progress. We don't expect to bring this to a completion overnight, but I do believe honestly and sincerely that, with dedication and perseverence along the lines that have been approved, we can within a few years get on top of this very large program, manage it effectively and provide a proper stewardship for it.

Chairman Stennis. I believe you will do it if you are permitted to

stay with it and not sent off somewhere on another mission.

That is encouraging, what you say. I have always said the Navy does things mighty well and does a good job and they don't come up to the Hill unless they are prepared. I compliment them in that way. Any service has a lot of personnel problems, I know. It seems like you

have handled those well. But this matter of the overruns and all has about whipped me down. The first impression I got as the new chairman of the committee was that you gentlemen were the victims of this and we were, too. I have talked to the Chiefs about it and said that civilian authority was the ultimate authority over all the services but responsibility rests primarily on the man in uniform. You get the blame. It is the Navy—they forget who the Secretary of the Navy may be. It makes no difference how fine he is, they blame the Navy. And I have said you had to put more of your talent on this problem because it affects any of you who are on it.

I am encouraged by what you say, gentlemen. I can see the immensity of this thing. I think these contractors want to get in at that low figure and frankly I think you gentlemen, you like to have these weapons, too. You want to get started on something. So you are happy when you get something authorized and see the initial part. I believe

strongly in the best weapons.

All right. Did you want to add something? Admiral Cousins. No. sir.

MINESWEEPER CONTRACT

Chairman Stennis. Now, on the minesweepers, this is MSO Minesweepers, have you awarded the contract for the 10 ships funded in

1969? If so, when? What type of contracts, and so forth?

Admiral Sonenshein. Yes, sir. We have awarded a contract for five ships of those 10, those five ships being for the Atlantic Fleet on the east coast. On the west coast we have canceled the bidding process, that was underway, because we found that some irregularities had developed in the procurement process, and I will describe those in a minute.

We intend to resolicit offers on the west coast for those five ships

and our target date to award is June 30, 1970.

The difficulty we encountered on the west coast with the five ships which are home ported in the Long Beach, Calif., area was that the specifications for the conversion which included repair work had become inaccurate.

During the period from the time the specifications were prepared in Washington until the bids were received, the five ships were given interim repair work, what we call restricted availabilities, in the Long Beach area and some of the work accomplished was in the original specifications for the conversion.

When we found this out, we realized that not all of the five bidders on the west coast were privy to this information. Only certain ones appeared to be privy to the fact that the scope had been reduced

by the interim work.

We felt this provided an unfair bidding climate so we canceled that procurement. We are going to resolicit in April for award on June 30.

Chairman Stennis. All right. Now, you are still talking about the 1969 ships, the 10.

Admiral Sonenshein. Yes, sir. Chairman Stennis. All right.

Admiral Sonenshein. May I add one other thing? We have five other ships in the 1970 program that we are going to solicit at the same time with the five on the west coast left from 1969.

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Chairman Stennis. All right. Does the \$46.8 million in the 1969 column represent contractual target or ceiling costs?

Admiral Sonenshein. The MSO's?

Chairman STENNIS. Still on this 1969 now. Does the \$46.8 million—

Admiral Sonenshein. That would be—that is in the previous year's the 1969 program?

Chairman Stennis. Previous year's.

Admiral Sonenshein. \$46.8.

Chairman STENNIS. Previous to 1969?

Admiral Sonenshein. That is the 1969 program.

Chairman Stennis. Well, the question is, does this figure represent

contractual target or ceiling cost?

Admiral Sonenshein. The \$46.8 million represents the estimated end cost of the 10 ships. Because of Government furnished material the ship portion would be somewhat less. Contracts for the conversion portion are fixed price, however the rehabilitation portion is subject to negotiation.

Chairman STENNIS. Well, now, coming to the 1970 program, when

will you award a contract for the five ships in the 1970 program?

Admiral Sonenshein. We intend to solicit these with the five residual ones from the 1969 program.

Chairman Stennis. Does the \$26 million there represent target or ceiling cost! I suppose that is—

Admiral Sonenshein. Again that is the estimated end cost of the ships.

Chairman Stennis. Are you going to build the 1969 and the 1970 MSO's from the same specifications?

Admiral Sonenshein. We are up-dating the specifications.

Chairman STENNIS. In what way?

Admiral Sonenshein. To eliminate the discrepancies that appeared in them before and also to incorporate a few technical features that were not developed in time to incorporate in the previous solicitation, but the work will be substantially similar in scope to the previous one.

Chairman Stennis. Back to the POLARIS submarine now. How much would you save if you overhauled the POLARIS submarine

rather than convert it?

Admiral Cousins. Mr. Chairman-

Chairman Stennis. You have to overhaul and convert when you convert, do you not?
Admiral Cousins. About two-thirds of the cost is for the overhaul.

Admiral Cousins. About two-thirds of the cost is for the overhaul. Chairman Stennis. All right. Put a dollar on that estimate on it. Admiral Gaddis. Approximately \$49 million. We can correct that for the record, sir.

Chairman STENNIS. Well, that would be \$24.5 million in round numbers which you save because you didn't convert. Is that right?

Admiral Gappis. That is the additional cost.

Admiral Smith. It comes to about \$33 million to convert. So if it were not converted, however, that includes the procurement of the POSEIDON equipment that is to go in there. The amount in the shippard is about \$12 million of that.

Chairman Stennis. So it is a \$33 million job to convert and put

in your-

Admiral SMITH. To buy the equipment and install it and make the alterations to the ship.

Chairman STENNIS. Why are your overhaul costs now being submitted here for authorization rather than through O. & M. funds?

Admiral Gaddis. It is policy, sir, when you convert a ship to do all of the cost of conversion in one line item as one project in the ship-building and conversion appropriation. This is a part of the description under the title of that appropriation, sir. If you overhauled your ship at a separate time for a separate purpose, then the overhaul of that ship would be a charge against the operations and maintenance appropriation. Because of the fact that you put it out of commission and convert it, all of the work is done in one appropriation.

Chairman STENNIS. That is the policy you follow.

Admiral Smith. Yes, sir.

Admiral Cousins. That is the SCN.

Admiral Sonenshein. That also applies to the minesweepers we

were talking about.

Chairman Stennis. I think that is a good explanation. If something is just overhaul, you go to the Appropriations Committee. We won't be jealous a bit.

PREPARED QUESTIONS FROM SENATOR SMITH

Let the record show that Senator Smith has questions for Admiral Cousins for the record. We hope that you can get the replies back within a week. If you need more time, notify Mr. Braswell.

(Questions submitted by Senator Smith. Answers supplied by the Department of the Navy.)

Question. The DD-963 destroyer was originally estimated by the Navy in December 1967 to cost approximately \$35 million each. As of September 1969, the estimates had increased to \$68 million each. Three months later, as of December 1969, the estimate was again increased to \$83 million each. Is the current estimate valid and what is the Navy doing to improve their cost estimating procedures?

Answer. The \$35M average costs referred to was a preliminary program estimate made by OSD prior to completion of DD 963 concept formulation. In other words, it was made before firm characteristics of the ship were approved.

The first Navy estimate for a 30 ship DD 963 program was \$1,708.7M. This amount together with costs for Concept Formulation, Contract Definition, outfitting and delivery costs resulted in an average notional ship cost of \$59.5M. The GAO has recognized this as the proper baseline planning estimate and it is so used in the SAR reports. The current estimate is the first based on actual ship proposals as developed through Contract Definition and on pricing guidelines for FY 1971 budget submissions. It reflects results of contractor studies and in-depth analysis by Navy evaluation teams and is therefore considered valid.

With a view of improving cost estimates of shipbuilding programs, we have augmented the professional estimating staff; inaugurated a system for ensuring the currency of our estimates in relation to proposed ship configuration; and are working on improving our basic data resources in terms of collection, storage and retrieval.

Question. The Secretary of Defense testified that aircraft carrier CVAN 70 would cost some \$640 million. The Navy currently estimates the cost for CVAN 68 at \$544 million and CVAN 69 at \$519 million. Are these costs realistic in view of the increased cost for CVAN 70?

Answer. In August 1967 the Navy estimated the cost of Nimitz (CVAN-68) to be \$544.2 million. The cost of Eisenhower (CVAN-69) was estimated to be \$519.2 million. In December 1968 a program budget decision directed deletion

of funds for outfitting and post delivery as entries not directly associated with the construction of ships. This deletion reduced the budget amount for these ships to \$536 million for *Nimitz* and \$510 million for *Eisenhower*.

The Navy expects negotiations to be completed this spring which will estab-

lish target and ceiling prices for the Nimitz and Eisenhower.

The Navy anticipates that the target prices for the two ships will fall within the amount allowed for the shipbuilding contract in the budget estimates. If the Navy is not successful in negotiating target prices within the present budget

estimate, the budget estimate will have to be revised at that time.

However, even when negotiations are completed and the contract terms and pricing arrangements are settled the Navy will still not be able to predict the ultimate end cost with accuracy until actual ship construction is considerably advanced. This is so because there are many uncertainties involved in constructing these complex warships, and it is not possible to know in advance exactly how much effort will be required to build them. It is for these reasons that a fixed price incentive fee type contract is used for this type of work. This type contract contains an incentive sharing arrangement where the Government pays a large part of the costs should they exceed the target cost. Therefore, the Navy's liability under this type contract may exceed the target prices.

Further, the Navy has no control over changes in market prices for labor and materials. If the changes in market prices (inflation) are different from what the Navy has been permitted to budget, then the costs of ships will change accordingly. The present budget estimates for the Nimitz and Eisenhower are based on FY 1967 shipbuilding labor rates and material prices in effect when the Nimitz class was started and include a reserve for escalation based on the Shipbuilding and Conversion, Navy (SCN) escalation budget formula which applies to all ships. This budget formula has for the last several years restricted the escalation reserve in all Navy ship budget estimates to 7.5 percent of the estimated shipbuilding contract price. Budget estimates for ships planned for the FY 1971 and FY 1972 programs include an escalation reserve based on 10% of the estimated shipbuilder's contract price.

The budget estimate of \$640M for the CVAN-70 is based on shipbuilder labor rates and material costs currently estimated for FY 1972 and also contains an escalation reserve of 10% of the estimated shipbuilding contract price.

Question. The Navy is currently purchasing P-3C antisubmarine aircraft. Would it be more cost effective to update the existing 17 squadrons of P-3A and B's in lieu of purchasing new P-3C's?

Answer. An initial investigation indicated that it was not cost effective to update the P-3A and B aircraft to the P-3C capability. The cost for modifying the older aircraft exceeded 80 percent of the cost of procuring new aircraft—and the average airframe age of the modified aircraft approached 8 years or over one half of its approved service life. However, this alternative will continue to be reviewed for consideration.

Question, Last year the Congress authorized 3 SSN-688 attack submarines and long lead procurement for 5 additional submarines. This year the Navy is requesting authorization for only 3 additional submarines. Also, we understand that this program schedule will slip because a Brickbat priority has not been assigned. In view of the Russian threat, why has the Navy requested only 3 additional submarines and not assigned a high priority to this program?

Answer. We would like to build five attack submarines per year toward our goal of an all nuclear attack submarine force. This year, availability of resources limited the Navy's budget submit to only four of these ships; subsequent budget decisions reduced this number to three.

The SSN 688 Class Initial Project Plan prepared by Naval Ship Systems Command in September 1968 included a delivery date for SSN 688 of [deleted] based on the assumption that Brickbat priority would be assigned to the SSN 688 Class. The Navy has attempted without success to obtain Brickbat priority for the SSN 688 Class program. The Secretary of the Navy informed the Secretary of Defense that if Brickbat was not assigned, a slippage of [deleted] would occur for these urgently needed ships.

The Assistant Secretary of the Navy (Installations and Logistics) stated on January 6, 1969 in the Navy's initial request for [Brickbat priority] for the SSN 688 Class Submarine Program: "The milestones established for the production of the SSN 688 Class submarines are comparable to the actual experience of

the SSBN Program. Based on this comparison, it is apparent that only a Brickbat assignment can produce this new class submarine within the ordered time frame."

The Secretary of the Navy stated on 17 September 1969 in the Navy's second request for Brickbat priority for the SSN 688 Class Submarine Program: "Our SSN 688 Class Submarines must go to sea in the shortest possible time in order to maintain our qualitative superiority in submarines and to counter the Soviet submarine force.... Only a Brickbat (priority) assignment can produce this new class submarine within the ordered time frame."

On 19 March 1970, the Deputy Secretary of Defense recommended to the President that Brickbat priority be approved for selected items for the lead ship

(SSN 688) only. Mr. Packard stated:

"Recent developments in Soviet Submarine capabilities have significantly changed the comparative performance of U.S. and Soviet SSNs..."

"To meet this threat we are constructing a new class of submarines, the first

of which is the SSN 688..."

"Your favorable consideration of this assignment will enable automatic overriding priority where interference with other defense DO rated orders occurs throughout industry..."

Question. The Navy has developed two different models of the Mk-48 torpedo, i.e., the Mod 0/2 and the Mod. 1. Are there any parts common between the two torpedoes and what are the purposes of each model?

Answer. [Deleted.] The Mod O is the ASW version and will lead to the Mod 2 dual purpose version. The Mod 1 is competitive to the Mod 2 dual purpose (antiship/antisub) model.

Question. Some Navy Officials have estimated that a "set" electronic test and support equipment for the MK-48 cost approximately \$500,000. Can this equipment be used interchangeably between the two different torpedocx!

Answer. No. Senator. The test equipments are not interchangeable.

Question. [Deleted.]

Answer. This plan will be effective at maximum speed out to ranges of [deleted] yards which is certainly satisfactory for anti-surface ship use. At ranges less than this the explosive bubble energy of the Mod 2 will exceed that of the Mod 1.

Question. Can the Mod 0/2 operate effectively a maximum speed at shallow depths required for an anti-shipping role?

Answer. Yes, Senator. [Deleted.]

COMMITTEE RECESS

Chairman Stennis. Gentlemen, is there anything else that you want to go into?

Admiral Cousins. No, sir.

Chairman STENNIS. This has been a very profitable and interesting discussion for me and I thank you not only for myself but for the committee. We are going to have a lot of things to get into, gentlemen, before we get this bill marked up and we do not expect to get the bill through the Senate in 1 day either. If more questions come up, we may be calling on you again.

I think we have had a very busy day and I want to thank you

especially for coming here.

The committee stands adjourned until 10 o'clock tomorrow morning. (Whereupon, at 5:30 p.m., Wednesday, March 18, the committee was recessed, to reconvene at 10 a.m., Thursday, March 19.)

MILITARY PROCUREMENT FOR FISCAL YEAR 1971

THURSDAY, MARCH 19, 1970

U.S. SENATE,
COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The Committee on Armed Services met at 11:10 a.m., in room 212, Old Senate Office Building, Hon. John Stennis (chairman) presiding. Present: Senators Stennis (chairman), Symington, Jackson, Cannon, Inouye, McIntyre, Byrd of Virginia, Smith of Maine, Thurmond, Dominick, Brooke and Schweiker.

Of the staff of the Committee on Armed Services: T. Edward Braswell, Jr., chief of staff; and Labre R. Garcia, professional staff

member.

Of the staff of the Preparedness Investigating Subcommittee: James T. Kendall, chief counsel; Ben Gilleas, Director of Investigations; Hyman Fine, Ed Kenney, Don L. Lynch, and David A. Littleton, professional staff members.

DEPARTMENT OF THE NAVY

RESEARCH AND DEVELOPMENT

Chairman STENNIS. Members of the Committee, we will now proceed with taking the testimony by the Navy. These are the line items in research and development and Senator McIntyre and his subcommittee have been into this some already.

Senator, I am going to ask you to preside some today on these, if you

will, please.

Senator McIntyre. All right, sir.

Chairman Stennis. We are going to have two votes at 12 o'clock,

I understand, so we will have to recess at that time.

If it is agreeable with the committee, we propose now to let Dr. Frosch, who is Assistant Secretary of the Navy for Research and Development, proceed with his statement. Now, Doctor, you are a welcome witness here, a man who comes with how many pages—169 pages—of testimony. You must be asking for a lot of money to take that much to justify it. What do you propose to do now about your statement here, Doctor?

(1503:)

STATEMENT OF HON. ROBERT A. FROSCH, ASSISTANT SECRETARY OF THE NAVY (RESEARCH AND DEVELOPMENT); ACCOMPANIED BY REAR ADM. E. A. RUCKNER, DEPUTY CHIEF OF NAVAL OPERATIONS (DEVELOPMENT); REAR ADM. T. B. OWEN, CHIEF OF NAVAL RESEARCH; REAR ADM. T. D. DAVIES, DEPUTY CHIEF OF NAVAL MATERIAL (DEVELOPMENT); AND MAJ. GEN. L. METZGER, DEPUTY CHIEF OF STAFF (R.D. & S.), U.S. MARINE CORPS

Dr. Frosch. Mr. Chairman, we have tried to make up a full statement so that the committee can have all the information available to it. I would propose to offer the statement to the committee for insertion in the record at your pleasure, sir, and at this time I would propose to go through with you very shortly, leafing through the first part of the statement, and calling your attention to salient and important items for a few minutes rather than trying to read a major portion of it.

Chairman Stennis. All right. If it is agreeable to the committee I think that is a good suggestion and any Senator then or the subcommittee can question you on anything they wish. Do you have marked

copies here that you are going to read from?

Dr. Frosch. No, Mr. Chairman. I would propose to call attention to the pages that are—

Chairman Stennis. Yes, page number and then the approximate location on the page and we will pick it up fast.

Dr. Frosch. Certainly.

Chairman Stennis. All right, we are glad to have you here, sir.

You may proceed.

Dr. Frosch. Thank you. Mr. Chairman, it is a pleasure for me to have the opportunity to testify to you again on the R.D.T. & E. Navy program and budgets for fiscal 1971. If I might I would like to introduce to you the principal assistants who are with me and who work with me in carrying out these programs in the Navy. On my right is Admiral Ruckner who is the Deputy Chief of Naval Operations for Development. On my left, Admiral Owen, who is the Chief of Naval Research. Just behind me on my left is Admiral Davies, Chief of the Naval Development, Deputy Chief of Naval Material for Development, and over at the right is General Metzger, who is the Deputy Chief of Staff for Research, Development, and Studies for the Marine Corps.

Chairman STENNIS. All right, gentlemen. We are delighted to have

you here with us. We look forward to your contribution here.

Dr. Frosch. We cast the statement this year in the form of a brief statement followed by a series of appendixes, the appendixes going into considerably greater detail on the various programs that we are presenting to you.

On page 3 of the statement you will find table 1 which gives a breakout of the 1970 and 1971 request by the eight budget activities, and these details of fiscal management are expanded upon in the first ap-

pendix later in the statement.

On page 4 the same total is broken out by the DOD categories that we use in normal day-to-day operations inside the Department of Defense.

On page 5 of the statement you will find a list of the special topics that I will be mentioning in talking about these highlights this morning, and they are, of course, dealt within the statement in more detail

than I will be using.

On page 6, then, I would like to begin by making some comments about research and exploratory development. There are two elements in the research program, of course. One is for in-house laboratory independent research performed by our Navy laboratories. The second element is for defense research sciences. The purpose of the in-house laboratory independent research program, of course, is to maintain for the Navy an in-house capability for assessing and advancing the technologies that are critical to our various military missions.

At the bottom of the page we point out that the defense research sciences program supports research in the basic sciences areas that are important to the support of naval missions and that program, of course, is carried out both in Navy laboratories and by university and

industrial scientists.

On page 7 there is some discussion of section 203 of Public Law 91-121 which provides that none of the funds authorized may be used to carry out any research project unless that project has a direct and apparent relationship to a specific military function or operation. This has been in keeping with the general DOD longstanding policy on the use of the criterion of relevance in the selection of R.D.T. & E. programs.

We have been applying this explicitly and we have made special reviews to be sure that we are complying with this as well as institut-

ing some new procedures to keep track of that problem.

On page 8 and the following several pages there is a listing of a number of examples of recent accomplishments of research under defense research sciences. These are all relevant to Navy missions and requirements. I might mention some of these because they are good examples of how scientific work which sometimes doesn't have—for everyone—an obvious connection to military missions can fre-

quently be seen to have such a connection.

For example, No. 2 on page 8, this large scale refrigerator for operating at very, very low temperatures means that we can build electronic systems which will be much more compact, reliable, and efficient. The cryogenic technique would permit a great advance in certain kinds of radar and electronic warfare systems. The fact that we can build this refrigerator on this scale means that it will probably become a practical matter to obtain high efficiency in the transfer of electromagnetic radiation on board ship. On page 9 there is the mention of a collection of oceanographic data which is relevant to understanding long range propagation of sound in the ocean and is extremely important to our programs in ASW and in sonar.

It is also pointed out on page 9 that a significant portion of the defense research sciences element, about 29 percent of it, supports the oceanographic research program which is directly connected particularly with ASW problems as well as other problems of Naval opera-

tion at sea.

On page 10, on the lower third of it, we begin a discussion of exploratory development. Exploratory development is the transition area between research and engineering development. It is the area in which we take relevant research results and develop specific technology which will be utilized to solve specific military problems.

An example on the bottom of page 10 is wind tunnel tests on a new way of controlling helicopter rotor blade angle so that we believe it will be possible for a helicopter to go [deleted] faster than any helicopter we can build now with the current technology of such rotors.

Another example of interest is given on the bottom of page 11 which has to do with ultralightweight transceivers and techniques for battlefield surveillance and detection. This is the use of modern electronics technology to produce equipment which is lighter and smaller so that it is easier for the Marines to use in the field.

On pages 12, in the middle we menton the working support in exploratory development which is closely connected with questions of prediction of the environment so that Navy task forces can use this knowledge so that they can use and move in the ocean in the best way with regard to weather and oceanographic characteristics, to carry out their missions.

Also under that element we are doing the necessary engineering work so that the Navy can comply with recent legislative and Executive

orders having to do with pollution abatement.

On page 13 we begin the discussion of the management and support portion of this R.D.T. & E. program. This portion of the program covers everything from what amounts to housekeeping functions for laboratories and test establishments which are under facilities and installations support through the support of studies of strategy, tactics, logistics matters, that are under studies and analyses.

And most importantly, this includes not only the study effort which is labeled studies and analyses as mentioned at the bottom of page 13, but also that work which is carried out by the Center for Naval

Analysis.

On page 14 we discuss air warfare which encompasses all of the offensive and defensive tactical air warfare excluding ASW from airborne vehicles that are based on carrier or land against any sort of

target, whether surface, subsurface or other airborne targets.

I might mention here a little bit of the general strategy of R. & D. selection for aircraft and/or weapons. The longest range system which is intended for use against the enemy air-to-air fleet, and we can divide this conveniently between air-to-air and air-to-ground systems, is the F-14A/B system coupled with the PHOENIX. This system has the capability of task group defense of fleet elements against major incoming airborne threats.

Other air-to-air weapons included in this kind of thinking that can be put on the F-14A or B and, of course are carried by the F-4, are the SIDEWINDER, the SPARROW-E and F, and we are beginning development of technology that could turn into the AGILE [deleted]

missile.

As part of whole air-to-air defense picture, there is the E-2C which is the airborne early warning aircraft. The advanced avionics version that is now in development is intended to give early warning and to help control the air battle.

We are also paying attention to electronic countermeasures and to infrared countermeasures, shielding and signature reduction as part of this whole program. We are trying to cover the whole gamut of air-to-air warfare from long-range missile firing to short-range dogfighting.

In air to ground we have in the past few years brought in the A-6 and the A-7, as our principal air-to-ground attack aircraft in the Navy. These are capable of using bombs, free-drop bombs, and electro-optical weapons such as WALLEYE, or HOBO, and CONDOR.

We are developing BULLDOG, for the Marine air-to-ground attack.

[Deleted.]

We are looking at the Air Force PAVEWAY series and the Navy Eye series. This is an area in which because of the pressure of Vietnam a great many development efforts have been pursued.

One of the efforts underway between the Air Force, Navy and DOD at the present time is to try to simplify this whole collection of weap-

ons and get somewhat less redundancy.

I might also mention on page 17 the importance of the advanced technology engine being developed jointly under Air Force management acting jointly for both Air Force and Navy. This effort will develop a common core engine around which will be built the Navy engine for the F-14 and separately the Air Force engine for the F-15.

I mentioned most of the missiles including CONDOR and

I mentioned most of the missiles including CONDOR and PHOENIX that are discussed in this section. I might also call your attention again to the STANDARD ARM antiradiation missile intended to destroy ground control intercept radars and SAM sites.

This is mentioned on page 21.

I would move on to page 24 to surface warfare and here there are two major kinds of weaponry invloved. One is surface-to-air and the other is surface-to-surface, both in terms of offense and attack, and defense, In the surface-to-air we depend now on the three T's, the TARTARTERRIER-TALOS systems. We have begun development of the AEGIS system which would be the next generation of major improvement for that type of system.

We also have in this area of discussion the point defense missile systems which are the closer in shield around our ships, and finally the PHALANX gun system which is intended to be a very close in,

what we might call last ditch defense system.

Also included under this are the electronic warfare efforts which might be called electronic weapons which are used against the electronics of the radars and missile systems of the enemy, and these are as important as the actual killing weapons in providing a defensive-offensive suit for our ships.

In the surface-to-surface area we continue to use the three T's and STANDARD which have a surface-to-surface and surface-to-cruise missile capability, and we continue to use guns of various kinds and

we are working on longer range ammunition for them.

In this connection I should mention HARPOON which is beginning development to be a dual purpose weapon, a standoff weapon which could be used either by [deleted] in their surveillance roles against surface ships or surface submarines and as a surface to surface weapon of about [deleted] range for attacking other surface ships from surface ships.

The next section which begins on page 30 is strategic warfare. That includes the POSEIDON system, the beginning work on the ULMS system, the studies that we are doing on SABMIS, the ship antiballistic missile system possibility, and the work being done on fleet ballistic missile systems, command and control, including the SANGUINE extra low frequency system for which the initial experiments have begun in Wisconsin.

On page 34 there begins a section on antisubmarine warfare in which the major element in 1971 will be the research and development work being done for the S-3A, the ASW carrier based aircraft. This effort in ASW also includes the improvements to the [deleted] system discussed on pages 35 and 36 and the [deleted] system discussed on page 36 which will have its first what I might call experimental em-

ployment [deleted] this spring.

Also under ASW is the DIFAR sonobuoy mentioned on page 37. We are looking at and working towards a variation of the SQS 26

sonar system mentioned on pages 37 and 38 [deleted].

Also mentioned on page 38 is the torpedo MK-48 program with its various mods, Mod Zero and 1 and 2, which we have just begun to take the first steps towards production of the MK-48 Zero, but it is our intention to stay in a competitive condition between the 48 Zero and the 48-1.

Beginning on page 39 there is a section on Marine Corps programs. There has been some realignment in the organization of these programs which was initiated at the request of the Commandant of the Marine Corps so that we can have good identification of the responsibility for Marine Corps exploratory and other development programs.

Mentioned on page 41 is the fact that in fiscal 1971 we expect to complete R.D.T. & E. for the LVTP-12 family of amphibious vehicles. On page 42, there begins at the bottom a section on oceanography which discusses not only the R.D.T. & E. program but outlines the total oceanography program of the Navy including that in other appropriations than R.D.T. & E.

On page 43, the special importance of underwater sound as a sensor technology underlying ASW sensor systems is mentioned. We also discuss on page 44 the Ocean Engineering and Development work. On

page 45, the restructuring of the SEALAB program.

On page 47 and page 48, top of 48, we discuss the latest additions to

the oceanographic research fleet.

On page 48, we begin our discussion of space and of the portions of the space program for which the Navy has some special responsibility including the development of the timation technique that might be used in the future Defense Navigation Satellite Systems, the [deleted] of the operational transit navigation system, and the improvement of that system as discussed on page 50.

On page 52, the final section on electronic warfare, communications. and command and control which deals with particular aspects of electronic warfare, including the SHORTSTOP system for integration of electronic warfare and defenses on ships. The SAMID system which is our first attempt to build an integrated antimissile defense on ships which is now in some of our ships as an interim until we can get a final integrated system.

There is a discussion, on pages 56 and 57, of the various tactical data systems and the joint programs for advanced tactical command and Digitized by GOOGLE

control.

Mr. Chairman, that completes a very cursory guide through what is in the statement and what is in the program and I would stand ready for the questions of the committee.

I might mention that if there is time and the committee desires, we have about 15 minutes of film clip that show some technical items that

may be of interest, should you want to see it.

Chairman Stennis. Well, I believe that we can use this time here perhaps for your slides and also a few questions. We will see what the membership may desire. We will place your statement in the record.

(The statement follows:)

I

INTRODUCTION

It is a pleasure for me to have the opportunity again this year to submit to this committee the Navy Research, Development, Test and Evaluation Program and Budget for FY 1971.

With me again are my principal assistants in carrying out the RDT&E programs within the Navy. Rear Admiral E. A. Ruckner, Deputy Chief of Naval Operations (Development), Rear Admiral T. B. Owen, Chief of Naval Research, Rear Admiral T. O. Davies, Chief of Naval Development and Deputy Chief of Naval Material (Development), and Major General L. Metzger, Deputy Chief of Staff (Research, Development and Studies) USMC, all of whom appeared before this committee with me last year.

My presentation this year consists of a brief statement followed by a series of appendices which I propose to enter into the record of the committee in its entirety. The Statement, which I intend to present verbally at this time, defines the RDT&B, N program and budget in terms of the Navy Functional Areas. You will remember that I introduced this concept for your information as part of my statement for last year. As our R&D effort is related to mission responsibility of the Navy, I will offer an overview of the FY 71 program concentrating on the major RDT&E thrust in each of these areas.

The appendices which are presented for your detailed study contain Budgetary material and other information which has been specifically requested by or has proven of interest and value to the Congress in the past and will supplement and

support the material presented in my verbal statement.

I have provided copies of the complete document for the records of the committee. With the Chair's concurrence, I propose at this time to present my verbal statement. I will, of course, be happy to answer any questions from the Committee at any time considered appropriate.

II.-FISCAL YEAR 1971 R.D.T. & E., N FISCAL SUMMARY

The Navy Program request for RDT&E in FY 1971 consists of New Obligational Authority in the amount of \$2197.3M. Shown in Table I is the program divided among the eight budget activities. For comparative purposes the FY 1970 program is included.

TABLE I.—FISCAL YEAR 1971 R.D.T. & E., N PROGRAM BY BUDGET ACTIVITIES
[Dollars in millions]

	Fiscal year-		
_	1970	1971	
1. Military sciences	\$139.3	\$142.2	
2. Aircraft and related equipment	794. 9	693, 9	
3. Missiles and related equipment	458, 7	494, 3	
4. Military astronautics	19. 1	29, 1	
5. Ships, small craft, and related equipment	296. 3	377.7	
5. Ordnance, combat vehicles, and related equipment.	100, 4	89. 0	
7. Other equipment	242, 2	226, 5	
8. Program-wide management and support	148.7	144. 6	
Totals	2, 199, 6	2, 197, 3	

The FY 1971 proposal constitutes a decrease of about \$2.3 Million from FY 1970.

For purposes of our day-to-day operations within the Department of Defense. we divided the RDT&E program into six categories as shown in Table II.

TABLE II .- R.D.T. & E., NAVY BY DOD CATEGORIES

[Dollars in millions]

	Fiscal year		
_	1969	1970	1971
1. Research	\$130.3	\$117.9	\$118.9
2. Exploratory development	262. 1 296. 7	236. 1 280. 8	242.9 347.3
4. Engineering development	346. 0	392. 5	531.9
5. Management and support	228. 0	229.7	226. 1
6. Operational systems development	928. 4	942.6	730. 2
Total	2, 191. 5	2, 199. 6	2, 197. 3

III.—HIGHLIGHTS OF NAVY B&D PROGRAMS

The remainder of my statement today will be devoted to a discussion of the more important aspects of our R&D effort. I will divide my discussion into the areas of functional responsibility as shown below:

Research & Exploratory Development Management & Support

Air Warfare Surface Warfare Strategic Warfare Anti-Submarine Warfare Marine Corps Programs Oceanography

Space

EW/Communications/Command & Control

RESEARCH AND EXPLORATORY DEVELOPMENT

There are two elements in the Research program. One is for In-House Laboratory Independent Research performed by our Navy laboratories, and the second element is for Defense Research Sciences. The In-House Laboratory Independent Research Program maintains for the Navy an in-house capability of assessing and advancing technologies critical to our military missions.

Seventeen patents were issued in FY 1969 for ideas developed under this program, and ten additional applications for patents were submitted and are currently under review. Items included among the patents are an instrument for measuring absolute reflectance and transmittance at cryogenic temperatures, explosive welding, electrochemical cells for thermal batteries. a method of tempering unique specialty (martensitic type) alloys, and a polarized light reflectometer for improved infrared detectors.

The Defense Research Sciences Program supports research in the important physical, engineering, environmental, biomedical and behavioral sciences areas. This program is performed by the Navy laboratories and by university and industrial scientists. These efforts are carefully planned to generate new knowledge in those scientific disciplines that will contribute to improvement in naval options and capabilities.

In this regard, Section 203, Public Law 91-121, provides that none of the funds authorized may be used to carry out any research project or study unless such project or study has a direct and apparent relationship to a specific military function or operation. The DOD policy of some standing requiring that the criterion of relevance-to-military-missions be applied throughout the RDT&E program, has been and is being applied explicitly in every case. In keeping with this policy, we intend to comply fully and scrupulously with the law. And project which upon careful review is found in considered judgment not to have a direct and apparent relationship to a specific military function or operation will be discontinued.

Within the Navy new procedures and documentation for review of new research efforts, to assure compliance with Section 203, have been in effect since shortly after the enactment of the law. The review of current programs was undertaken at the same time. Some RDT&E work, a small fraction of the total, will be discontinued as a result of this review because it is of less direct relevance to military needs and functions.

Some of our objectives and recent accomplishment of this research under De-

fense Research Sciences follow:

1. Special plasticizer additives resulting in more powerful solid and liquid propellants; decreased radar interference caused by solid rocket motor exhaust; new batteries for meeting special Navy needs; and a unique system for closed cycle production of electricity.

2. The first large scale refrigerator to operate continuously below minus 457° F., an advance of prime importance to highly efficient, compact and reliable electronic systems for future use aboard ship and other weapons

platforms.

3. Completion of simulations of a wide variety of alternative inventory policies for the Polaris weapon system resulting in major reductions of inventory investments while maintaining current levels of effectiveness.

4. Clarification of our understanding of structural stresses and character-

istics associated with brittle failure in naval pressure vessels.

5. Recent completion of the interagency cooperative Project TEKTITE I producting important data about man's psychological reaction to long duration (60 days) in an underseas habitat.

6. The definition of environmental parameters within which Navy and Marine Corps personnel can function efficiently; improvement of methods for the diagnonis, treatment, and prevention of disease in combat areas; and prevention of biological deterioration of equipment and materials.

7. Navy Arctic Research Laboratory at Point Barrow, Alaska, was developed to meet the growing importance of the Arctic to the Navy and the nation. The Laboratory supports research in the Arctic Ocean and operates ice island research sites. The program emphasizes oceanography, underwater sound, sea ice, environmental conditions, and techniques of military construction on permafrost.

8. The collection, at all depths and for extended periods by means of self-contained instrument capsules, of ocean current velocity, temperature and pressure data required for understanding long range sound propagation.

A significant portion of the Defense Research Sciences element, approximately 29%, supports the Navy's Oceanographic Research Program. The Navy Oceanographic Research Programs are again faced with rising costs of research ship operations and large scale oceanographic experiments. Research emphasis has increased in these areas which relate to acoustics, lasers, ultrasensitive instruments, high temperature materials, logistics, large scale integration of electronic circuitry, automatic digital communications systems, deep submergence, energy conversion, and human performance in the ocean environment.

The Defense Research Sciences Element also provides funds to continue certain programs originally started in support of the DOD University Program (Project THEMIS). The THEMIS program will not be identified separately in FY 1971 and subsequent years. All of the work authorized in this program is related directly to the future needs of the Navy in the same manner as the general program, and its projects do and will also conform to Section 203 of the FY 1970 Authorization Act. A sample project is: "Dynamics of Cable Systems" at Catholic University. This is a fundamental investigation of the mechanics of underwater cables and the results lead to improved techniques in towing acoustic arrays, in deep mooring of buoys, and in other underwater handling operations.

EXPLORATORY DEVELOPMENT

The Exploratory Development Program is broad and varied. This program provides a transition from Research to Advanced and Engineering Development. It is intended to develop specific technology and learn how to utilize it to solve specific military problems. Some examples of this work include: In the field of vehicles, wind tunnel tests on a reversed velocity rotor are expected to confirm an anticipated possible increase in helicopter forward speeds. Silencing studies on submarines are leading to developments which may make the submarine less detectable by enemy sonars, active or passive. The application of solid state

electronics promises an improvement in the reliability of aircraft electrical

systems while reducing the total volume and weight.

Under the Command and Control Programs, the development of functional building and blocks for the Advanced Avionic Digital Computer will provide design flexibility needed by the various operational avionics requirements projected for the 1975–1985 time frame. Work is progressing on computer mass memories using ferro-acoustic and plated film techniques, which, in the next 3-5 years, should produce low cost and high density memories, which will be many times improved over that now available. In an additional 5-10 years, using electron optic techniques, we should see memory block densities of 50 million bits per square inch. These changes will add a new dimension to computer technology in terms of their flexibility and adaptability to solve military problems.

Among developments for the Marine Corps is an ultra-lightweight HF transceiver and techniques of battlefield surveillance and detection. Also sought are improved swimmer propulsion units and cold water exposure suits, as well as

terminally guided ground-based missiles.

In the Weaponry area, we are developing new propulsion systems for torpedoes. Methods of improving our ability to distinguish real, from false targets and selecting from multiple targets are being pursued. Technology to support a light, all-weather missile system will be developed so that small craft can

improve their self defense/offense capability.

In our Exploratory Development in the Support area we are developing technology to measure, and predict the environment (the atmosphere, the oceans, and the nuclear warfare environment) to support Navy operations. Selected environmental pollution studies will attempt to reduce the cost of the Navy's compliance with recent legislation and Executive Order on pollution abatement. Deep ocean engineering studies will stress the development of techniques, tools and equipment for emplacing fixed structures on the ocean bottom. Techniques are being developed to prevent deterioration by water exposure of glass reinforced plastic so that it may be better used for pressure hulls.

The foregoing items present only a few of the hundreds of areas in which technological advancement of the Navy is being pursued. Development efforts are being conducted in many other areas such as nuclear propulsion and shielding, satellites, surveillance, life sciences, deep search and retrieval, HY 180 steels

and other materials for construction.

MANAGEMENT AND SUPPORT

The RDT&E Management and Support category encompasses a variety of efforts. The coverage runs from housekeeping functions performed under Facilities and Installation Support to considerations of strategy under Studies and

Analyses.

The largest function supported under this category is the day-to-day support for our Research and Development facilities (laboratories, etc.). This is shown under the element Facilities and Installation Support which includes all facilities other than the Atlantic Underwater Test and Evaluation Center (AUTEC) and the Pacific Missile Range (PMR). These two specialized facilities are supported as separate elements.

Management and Technical Support programs will be carried out in FY 1971

in the areas of ASW and Strategic Warfare.

Study effort related to the broad spectrum of Navy and Marine Corps problems will be pursued under Center for Naval Analyses (both Navy and Marine Corps), and Navy and Marine Corps Studies and Analyses programs.

We will pursue several smaller programs in FY 1971 including such programs as Missile Flight Evaluation Systems, Technical Information Centers and Mutual

Weapons Development.

AIR WARFARE

We define Air Warfare as that Navy mission objective encompassing all forms of offensive and defensive tactical warfare, excluding ASW, prosecuted from airborne vehicles, either carrier-based or land-based, against surface, subsurface, or other airborne targets and including supporting programs for the vehicles themselves. We have included three harware groupings under this objective; Aircraft and Related Equipments, Air-Launched Missiles, and Air-Launched Ordnance.

Our objective is to develop aircraft weapons systems appropriate to the countering and the presenting of threats in the Air Warfare category. In doing so, the major goals of our programs are: to improve our fleet-air-defense and air-to-air combat through more effective aircraft, acquisition and fire control systems, air-to-air missiles, and AEW, Command and Control capabilities; and to enhance our offensive air-strike capability through decreased weapon delivery error (CEPs), increased weapons release stand-off range, improved airborne reconnaissance, and expanded night and all-weather attack.

The major Aircraft and Related Equipment programs are: the F-14A, E-2C, EA-6B and HXC (Heavy Lift Helo) aircraft: F-14B Advanced Technology

Engine, and Airborne Integrated Reconnaissance System (AIRS).

The F-14A will be a high-performance fighter aircraft equipped with long and short-range, multiple-shot air-to-air missile systems. It is expected to be a tremendous asset to Fleet Air Defense. The FY 71 funds will provide for first flight and initiation of Navy Preliminary Evaluation of the aircraft and its weapon system.

The E-2C will be a carrier-based AEW and Tactical Control Aircraft with inherent interceptor and strike control capability. The E-2C will be a primary element of the Task Group Commander's capability to direct our offensive and defensive efforts with ships and aircraft at sea and near land. It will give the fleet a significant air target detection capability. It will complement the F-14A in providing fleet air defense, early warning and threat evaluation. Through substitution of advanced sensors and other equipments in the basic E-2 airframe, it is expected to raise the system reliability over the presently deployed E-2A system and to improve radar performance. FY 71 funds will provide for flight testing of the two system prototype aircraft and continued engineering testing of the active elements of the integrated avionics equipments.

The EA-6B aircraft is a carrier-based Electronic Warfare System containing ECM systems and tactical jammer equipments. The FY 71 funds will allow completion of OPEVAL and the continued development of this advanced EW aircraft.

The HXC Helo is to be a crane-configured helicopter intended to lift 18 ton loads to meet Navy and Marine Corps requirements. It will considerably improve mobility of the Marine Combat Division through adding lift for a high percentage of Division equipment. It also promises to give a major improvement to the Navy Logistics System principally by using the crane helo/containerization concept and facilitating the ship on-off-intership loading technique. It would be a near term development. FY 71 funds will provide detail design completion, initiation of ground testing and evaluation.

Advanced engine technology for the F-14B is for the purpose of maximizing the F-14's air superiority-fighter capability. The new engine will have approximately 40 percent more thrust and 25 percent less weight than the TF-30 engine in the F-14A. The Air Force and Navy (Air Force as Executive Agency acting jointly for the two services) have conducted a design competition between General Electric and Pratt and Whitney for the engineering contract for a common-core engine for the F-14 and F-15 aircraft. The contract award to Pratt and Whitney was announced on 27 February 1970. The FY 71 funds will provide for the continued progress in engine development and engineering design necessary for transition from the F-14A to the F-14B. This engine will give the F-14B weapon system performance superior to the threats as now known and predicted.

The airborne Integrated Reconnaissance System (AIRS) will provide a composite system to provide fleet commanders with necessary real-time reconnaissance information around the clock. It is planned to engineer this system into the F-14 aircraft to provide an RF-14 as the Navy's next generation reconnaissance aircraft. I want to emphasize that I do not see this as the beginning of a new aircraft program, but rather as an attempt to look at the technology and implications of a reconnaissance version of the F-14.

The principal Air-Launched Missile programs are: the HARPOON Anti-Ship Missile; CONDOR and BULLDOG Air-to-Ground Missiles; PHOENIX and AGILE Air-to-Air Missiles; and the Standard ARM Anti-Radiation Missile.

HARPOON is intended to be an all-weather anti-ship weapon that can be air launched or surface launched against surfaced submarines, patrol craft, destroyers and larger combatant ships, merchant ships and trawlers. Such a weapon would provide the Navy with a ship-attack capability. The FY 71 funds will permit completion of critical field experiments, test of the basic weapon concept, elements of Contract Definition, selection of a development contractor and initiation of engineering development. We plan to combine our Navy laboratory capability with industry skills to produce a working prototype which will be tested in a military environment prior to a need to make a production contract

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The CONDOR is to be an air-to-surface missile with an electro-optical (TV) guidance system. Initially, a liquid rocket engine was intended for CONDOR, but technical difficulties during development tests necessitated a change to a solid rocket engine in July 1969. We are considering a revised plan where we would continue the CONDOR in RDT&E phase to conduct a thorough system technical/tactical evaluation with R&D missiles to optimize system characteristics and configuration before committing the CONDOR to production.

The BULLDOG close air support air-to-surface missile is an inventory BULL-PUP missile modified for use as an accurate weapon intended primarily for use by the Marine Corps. This is an interim development to provide early field availability of this type of missile. The FY 71 funds will provide engineering

development, contractor demonstration and commencement of OPEVAL.

The PHOENIX missile system will provide the F-14 aircraft with its primary fleet air defense capability. The PHOENIX missile control system (AWG-9) will be capable of controlling other missiles as well, i.e., SPARROW, SIDE-WINDER, and AGILE, and the M-61 Gun. Missile development has been very successful thus far and the contractor test program has provided a basis for production design with improved reliability and a potential for reduced cost. In

our test program to date we have had 20 successful firings.

AGILE is a proposed passive, short range air-to-air missile. Concurently, the Navy is participating in the study phase of the Air Force development of AIM-82. Initial application of AGILE is planned for the F-14 aircraft. However, this development could also improve the dog-fight performance of F-4 and self-defense capability of A-6 and A-7 aircraft. FY 71 funds will allow Concept Formulation and advanced development to continue. Engineering Development is planned to commence as soon as hardware tests and evaluations have confirmed that the missile desired can be engineered with high confidence.

STANDARD ARM is an Anti-Radiation Missile to provide strike forces with a capability to destroy SAM sites and Ground Control Intercept (GCI) radars. This program has recently undergone a thorough review in the Navy and the program is now directed toward development of improvements in the missile and modification of the APS-118 Target Identification and Acquisition System (TIAS) to improve its compatibility with the A-6 weapon delivery system at a somewhat lower cost. STANDARD ARM used in conjunction with the E-2C. fighter aircraft and the EA-6B will permit the strike group to more safely penetrate well defended target areas.

The predominant Air Launched Ordnance programs are: Conventional Ordnance Development; Unguided Conventional Air-Launched Weapons; and Air-

craft Ordnance Safety.

The Conventional Ordnance Development Program effort is directed toward development of an Anti-Personnel/Anti-Material (AP/AM) cluster weapon, an Incendiary Bomblet, improvement of our General Purpose Bomb, and a Light Weight 20MM Gun Pod. The AP/AM weapon is designed for use with the ROCK-EYE dispenser. The delivery characteristics can be adjusted for target hardness and air burst to maximize effects. FY 71 funds will allow continued Engineering Development and evaluation of prototype hardware which will lead to initiation of OPEVAL. The Incendiary Bomblet will also be packaged in the ROCKEYE dispenser. FY 71 funds will allow completion of bomblet and fuze designs and fabrication of development models for testing. Improvements of the General Purpose Bomb will investigate in-flight options, and increased cook-off time. FY 71 funds will allow completion of system effectiveness studies and initiation of advanced development of the bomb case design. The Light Weight 20MM Gun Pod is intended for use on helicopters and light attack aircraft. An aircraft pod is under development to house an inventory MK-12 20MM aircraft gun and ammunition. FY 71 funds will provide for initiation of engineering development and test development hardware of the XM-197, 3 barrel gun in a suitable light weight pod.

The Unguided Conventional Air-Launched Weapons program contains four development projects in FY 71. The Multi-Purpose 20MM Round is aimed at developing a suitable 20MM round for joint service use and to provide improved penetration and fragmentation. It will feature a primer capable of percussion, or electric initiation safed from radiation bazards. FY 71 funds will complete engineering development. DENEYE is a project to develop air droppable anti-vehicle and anti-personnel mines. These mines can be used in support of troops and for area denial in the interdiction role. FY 71 funds will continue engineering development leading to OPEVAL. ZAP is a hypervelocity cluster-warhead aircraft rocket primarily used for flak suppression and vehicle destruction. It is expected

to replace the 2.75 and Zuni rockets. FY 71 funds will support optimized general purpose warhead design and improvements in motor, pod and fins for cost reduction. The Fuel Air Explosive Weapon (FAE) is a weapon that maximizes the blast. The low speed delivery weapon has completed development. FY 71 funds will allow continued development to improve the high speed delivery capabilities.

SURFACE WARFARE

In the Surface Warfare area our FY 1971 development program includes significant effort directed toward the availability of the weapons and ships that will shape our surface forces of the late 70's and beyond. New weapons include area and point defense missile systems, as well as new gun ordnance. New hull types and new propulsion principles will be brought forward so that our new ships will embody the advantages of advancements in shipbuilding technology.

We are commencing the Engineering Development of the Advanced Surface Missile System in FY 1970. This system, now called AEGIS, will include a combined AAW/ASW guided missile launching system and a modification of the existing STANDARD missile. AEGIS is being developed primarily for installation aboard new ships that will join the Fleet in late FY 76 and beyond. The large increase in warfare capability that AEGIS equipped ships will provide us is essential for meeting the threat of the late 1970's and beyond. The AEGIS development program is carefully constructed to be sure that decisions to enter into production are supported by technical and operational demonstrations of our readiness to do so. These demonstrations will be made in at-sea environments aboard the USS NORTON SOUND. In FY 1971 we will move forward with the design and fabrication of the engineering development models to be installed aboard that test ship.

Our plans to meet the air and anti-ship missile threats are based on the continued presence of effective TERRIER, TARTAR and TALOS ships well into the 1980's until AEGIS equipped ships are available in substantial force levels. We plan RDT&E effort in FY 1971 to upgrade thee 3T systems to combat the increasingly severe threats such as the anti-ship missiles of the Soviet bloc.

In the Combined AAW/ASW Guided Missile Launching System MK 26 program in FY 71, we expect to finish most of the work on the construction of two

prototypes of this launcher.

The objective of the Point Defense Systems Development Program is the development of the Improved Point Defense Surface Missile System. You will recall that the Basic Point Defense System, now operational in the Fleet, was developed on an urgent basis using modifications of existing aircraft and ship-board hardware. The improved system consists of all new equipment except the SPARROW missile. The system will represent a significant improvement over our Basic Point Defense System, giving the Navy an all-weather, rapid reaction, surface-to-air missile system for self-defense against the aircraft and anti-ship missile threat of the 1970's.

The components of the improved system are being developed under two projects: the new lightweight launcher, digital fire control system, and modification of the SPARROW missile will be produced by the NATO SEASPARROW Cooperative Development project. The Target Acquisition System and its integration with NATO SEASPARROW will be supported by the Point Defense Improvements project.

Both projects began Engineering Development in FY 70 and will continue into FY 71.

This program element has also supported the Engineering Development of an acquisition radar for the Basic Point Defense System. The contract for this development was awarded to Westinghouse in August 1969.

The Close-In Weapon System project PHALANX, initiated in FY 70, should provide a self contained rapid reaction lightweight system capable of providing

for a last ditch self defense against anti-ship missiles.

Conventional Ordnance Equipment supports engineering development effort leading to improved gun systems, fire control systems, rockets for gunfire support and anti-ship missile protection. We have delivered to the fleet the 5"/38 Rocket Assisted Projectile (RAP) which increases the effective range of our present guns. Technical Evaluation of the 5"/54 RAP is now underway.

The Bombardment Rocket will complete development effort. The 5"/54 Light Weight Gun (LWG) and the MK 86 Gunfire Control System are undergoing

concurrent evaluation aboard the USS NORTON SOUND.

The Long Range Bombardment Ammunition project will complete technical evaluation in FY 70. This project utilizes subcaliber projectiles in 8-inch bag guns as a means of extending ranges. The prime application is in the harassing/interdiction mission.

The Major Caliber Light Weight Gun prototype as a 175mm gun will undergo firing tests. Requirements have been revised to provide that the production version of the MCLWG will be an 8-inch gun. This gun will be capable of firing conventional projectiles. The design work for a new projectile will commence in FY 71. The gun will also be capable of firing the existing inventory of 8-inch projectiles. The MCLWG will utilize the same MK 86 GFCS as the 5"/54 LWG. Our effort in FY 71 will be continued development of the Major Caliber Light

Weight Gun, and completion of evaluation of the 5"/54 MK 45 LWG.

Joint development of the marine *Inertial Navigation System* by the United States and the Federal Republic of Germany will be completed with the delivery to Germany of one unit and a production data package. The U.S. will continue the program to provide an automatic position update to system. Evaluation of a system interface with NAVSAT and OMEGA will be started in FY 71.

The FY 71 efforts in Night Surveillance Equipment will be directed toward the development and testing of a Shipboard Imaging System and Low Light Level TV Systems. Development of Stabilization and Dual Magnification of Direct View Devices is continuing in FY 70.

The AIMS program is a tri-service project to provide *IFF* and *Air Traffic Control* for use by the Military with integration with the FAA systems. Implementation of the system to meet FAA requirements will be completed by January 1973.

The development effort aimed at large multi-thousand ton Surface Effect Ships in FY 71 has become primarily a Navy oriented program due to the reduced participation of the Department of Commerce. Such ships, as you may recall, travel on a cushion of air. With very high speed they have the potential for revolutionizing naval warfare.

STRATEGIC WARFARE

The Navy's mission objective in *Strategic Warfare* is to provide survivable, mobile sea-based strategic offensive and defensive forces to the total strategic force mix of the United States. We have only one functional area, Sea-Based Strategic Systems, which includes all of the RDT&E,N programs covering this mission objective. FBM Systems, FBM Command and Control and the Undersea Long-Range Missile System (ULMS) are some of the familiar and continuing major programs. Major increases in FY 71 include ULMS engineering studies and SSBN defense: decreases are in FBM systems modifications.

Other programs included in our FY 1971 effort are SSBN Defense, Seabased Ballistic Missile Intercept System (SABMIS), Strategic Systems Technical Support, and Navy coordination with the Air Force managed Advanced Ballistic Re-entry System (ABRES). In addition we are requesting funds for Navy sup-

port to the Army SAFEGUARD ABM Test Target Program.

The Fleet Ballistic Missile System with the POLARIS missile has been operational since 1960. The POSEIDON Development program is continuing on schedule to support initial deployment in January 1971. The first POSEIDON flight test vehicle was successfully flown from Cape Kennedy on August 16, 1968. There have been a total of eleven successful flights and five unsuccessful flights. The first shipboard flight test was made from the USS OBSERVATION ISLAND in December 1969.

The SSBN Defense Program is developing technology to insure the long term security of our SSBN force. In FY 70 we are undertaking the gathering of data to further assess areas of vulnerability which might affect the security of the FBM force. For FY 71, funds will support further development in this area.

Development of improvements in the ability of our FBM Command and Control communications network to survive nuclear attack continues. A higher power transmitter for the airborne VLF relay system, TACAMO, will complete feasibility demonstrations in March 1970. Construction of a SANGUINE test facility in northern Wisconsin is complete. This test facility will primarily seek to demonstrate effective and economic ways of mitigating the interference effects of the extremely low frequency (ELF) system on the utility systems in the area as well as confirm propagation predictions. Research will also continue on ELF effects on the ecology as well as potential physiological hazards to man. As a result of the experimental measurement program carried out over the last few years, it

was determined last fall that significant reductions in the transmitted power levels could be made without sacrificing performance. A review of the system design is currently underway to determine the extent to which the lower power option will relieve the mitigation problem and reduce the possibility of any impact on the ecology. Alternate sites for more compact system configuration than the baseline system in geographic locations other than Wisconsin are also being evaluated.

We are continuing to develop the Undersea Long-Range Missile System (ULMS). This program involves the development of a more efficient, survivable, sea-based strategic offensive system capable of launching ballistic missiles from improved design, quieter submarines. The long-range missile would ensure continued survivability against a possible Soviet breakthrough in ASW warfare. The long-range missile would increase considerably the available submarine operating area and provide a threat over the entire Soviet defense perimeter. The improved design submarine is expected to have a high at-sea to in-port ratio.

In FY 1971 we plan to complete the preliminary ship design.

The Sea-Based Ballistic Missile Intercept System (SABMIS) concept, which is under study, might provide early detection and intercept of missiles far from the continental United States and thus possibly provide, with the SAFEGUARD system, a defense-in-depth against ICBMs.

In FY 1971 for Anti-Ballistic Missile Support we are to configure excess, no longer deployed, POLARIS missiles as targets in support of the Army SAFE-GUARD Program. Continued Navy support of this Army program is anticipated through the end of FY 1973.

ANTI-SUBMARINE WARFARE

Our emphasis in ASW R&D systems for FY 71, exclusive of research and exploratory development, is directed largely in two areas. The first is the development of the S-3A carrier-based aircraft. The S-3A will have an increased search rate over the current S-2E. Equally important will be its expanded capacity as an integrated system to process and utilize data from advanced sensors.

The contract for developing the S-3A was awarded in August 1969 to the Lockheed-California Company. Its engine, the TF-34 developed by General Electric, will provide essentially the same endurance at sea level as at altitude thereby increasing the tactical flexibility of the S-3A. The combined technical advances in this aircraft will give us a step increase in Air ASW effectiveness.

The second area of importance is the development of better acoustic sensors

for all ASW platforms.

In order to obtain data necessary for developing future surveillance systems we are engaged in the Long Range Acoustic Propagation Project (LRAPP). Under this project we will continue an experiment for collecting simultaneous acoustic and oceanographic data.

In order to improve the sensors of Air ASW, the Navy has started development of Advanced Acoustic Search Sensor Systems. Primary efforts will be toward building on our new JEZEBEL capability to obtain an improved sono-buoy compatible with the present DIFAR processor.

In surface ship sonars we are planning near term improvements to the SQS-26 sonar. We are working toward entering contract definition for this improved

variation of the SQS-26.

Our most important submarine sonar R&D program is the BQS-13 DNA development initiated in 1970. This sonar will incorporate recent technology advances and should provide a significant improvement in the effectiveness of our future submarines.

In anticipation of a still quieter threat in the late 1970's we are studying an advanced sonar system for our new construction submarines of that period. This system, called New DD/New Sub Sonar, is planned as an integrated development of surface ship and submarine sonar systems in order to obtain maximum

commonality.

In FY 71 the single largest ASW R&D effort other than the S-3A and sensor systems is the torpedo MK 48. The magnitude of improvement of the MK 48 over the current MK 37 is seen by comparing their acquisition capability. The MK 48 has the capability of searching out and detecting targets in a volume of the ocean much greater than the volume searched by the MK 37. Its advantages in speed, range, and depth are also significant. We anticipate initiating procurement this fiscal year. Development of a dual ASW/Anti-Ship version of this weapon will also continue.

Most of the remainder of our ASW R&D systems funding will be in countermeasures, command and control, and necessary ASW facilities and support including such facilities as AUTEC.

In summary, our major emphasis on ASW systems in FY 71 will be on the S-3A, on improved detection systems for all platforms, and in remedying the deficiency in conventional weapons of our modern SSNs.

MARINE CORPS PROGRAMS

The Marine Corps has the responsibility for developing in coordination with the other Services, the doctrines, tactics, and equipment employed by landing forces in amphibious operations. The Marine Corps R&D program represents approximately one-half of one percent of the total DOD RDT&E budget request. Many of its requirements are satisfied through other Service developments either unilaterally by the other Services or a joint development project with the Marine Corps. The Marine Corps undertakes unilateral development programs only when the programs of the other Services do not meet its requirements.

Certain realignment of functions has been made which is expected to increase efficiency. For example, the Marine Corps FY 1971 R&D program places the Marine Corps exploratory development efforts under the technical management of the Chief of Naval Material. Efforts were initiated by the Commandant of the Marine Corps (CMC) during FY 69 and an agreement was reached with the Chief of Naval Material (CNM) whereby exploratory development would be funded for and conducted on behalf of the Marine Corps by the CNM in response to requirements established by the CMC. In FY 71, then, although funding for Marine Corps exploratory development still appears under the two existing program elements, Marine Corps Weaponry and Vchicles Exploratory Development and Other Marine Corps Exploratory Development, the administration of these elements will rest with CNM. As a result of this transfer, it is expected that the Marine Corps exploratory development requirements will be more effectively met. Moreover, it will provide an additional safeguard against duplication of effort in the area of exploratory development.

As a result of the realignment of exploratory development responsibilities, a separate element has been established to provide support for the R&D effort undertaken by the Marine Corps Development and Education Command, Quantico, Virginia. Funding for this activity previously has been carried under Other Marine Corps Exploratory Development. The Management and Support category is considered to be the most appropriate source of funds for this type of activity. In addition, by establishing a separate element, a better visibility of funding requirements can be provided.

FY 1971 will see the completion of RDT&E funding for the LVTPX-12 family of amphibious vehicles.

The test program for the mine clearance version is scheduled for completion in FY 1971. In addition, production of the command and recovery versions will begin during FY 1971. Initial issue of the personnel carrier, recovery and command vehicles is scheduled for FY 1972 while the mine clearance version will be delivered to the Fleet Marine Force at a later date.

Advanced development will be initiated for the *Position Location and Reporting System* beginning in FY 1971. A feasibility study conducted under exploratory development will be completed in March of 1970. This will be followed by procurement of brassboard hardware and the development of software for testing systems concepts.

The fabrication of a Service Test Model (STM) of the AN/TPQ-27 Radar System was initiated during FY 1970 for the Marine Direct Air Support System and a service evaluation will commence at that time.

To maintain an effective force in readiness and to provide for future operational requirements, the Marine Corps will engage in a balanced Studies and Analyses program. Studies currently proposed for FY 1971 range from Logistics Support Ashore for Sustained Operations, to Survivability of Troop/Cargo V/STOL Aircraft. The support provided by the Marine Corps Operational Analysis Group under the Center for Naval Analyses program element is closely related to the studies effort.

OCEANOGRAPHY

I will now address the Navy's program in oceanography. Though we contribute in a major way to the broad National program to explore and exploit the oceans, the Navy limits its efforts to those which are directly related to National Security requirements. Our program continues to represent over one-half of the total

Federal effort, which reflects the importance of oceanography to military operations.

The funding represents the Navy's Oceanographic Program managed by the Oceanographer of the Navy, and is a compendium of efforts which appear in the budget as part of many line items in all appropriations.

NAVY OCEANOGRAPHIC PROGRAM

[Dollars in millions]

	Fiscal year—		
	1969	1970	1971
R.D.T. & ESCN	\$120. 4	\$109. 9	\$96. 8 7. 3
SGN MILCONOPN	4. 6 31. 1	3. 1 28. 2	2. 7 14. 6
O. & M.N	78. 6 12. 8	82. 8 10. 5	79. 0 9. 4
PAMN	. 2	10. 8	.4
Total	247. 7	245. 3	210. 2

For management purposes, the Oceanographer of the Navy divides his program into 3 areas—Science, Engineering and Development, and Operations. I will now briefly address the highlights of each of these areas.

Underwater sound continues to be an essential sensor technique in undersea warfare, and over half of the Navy Ocean Science Program continues to be devoted to further understanding the environment's influence on it. The broad Science Program is aimed at supporting all Navy operations through a better understanding of the total ocean environment with emphasis on the attainment of a predictive capability. A balance of effort is maintained among research, exploratory development and advanced development, with heavy reliance on the academic community, industry and Navy laboratories.

The nature of oceanographic research has recently undergone a noticeable change. The exploratory character of work of the past decade has largely given way to a concentration on the development and use of models to translate environmental factors into effects on weapons systems. This evolution toward modeling has been made possible by complementary advances in our understanding of the oceans, the ability to process data rapidly, and in the instruments and data collection platform we utilize which greatly improve the speed, density and accuracy of environmental sensing.

A predictive capability is frequently the payoff point in environmental sciences and is particularly important and productive as related to such naval concerns as ASW system performance, ship routing, and ice prediction. This same predictive capability also inherently provides a basis for better design of experiments, and provides a spin-off support to such National goals as pollution control, enchancement of fisheries, and protection of coastal facilities.

The Ocean Engineering and Development effort is directed toward the goal of permitting the Navy to operate effectively anywhere in the oceans, at any depths, and anytime. Our major project to develop a Deep Submergence Rescue Vehicle is reaching fruition. The DSRV, designed to rescue personnel from a disabled submarine on the ocean floor, is now undergoing at-sea tests. As the test program progresses, FY 71 should see a gradual improvement in the capability.

We will continue to develop new structural and buoyancy materials, power, vehicle control, and life support systems and other equipments and systems required if we are to operate effectively anywhere in the oceans. Our Deep Ocean Technology project is the focus for these developments.

In the coming year, our Biomedical research will continue to concentrate on the prevention and treatment of illness and injury of men below the sea's surface, and include techniques for the on-site treatment and evacuation of sick or injured divers.

We have restructured our planned efforts in the Man-In-The-Sea project since the aborted SEALAB III experiment of last year, increasing emphasis on safety and proceeding at a more deliberate pace to increased depths.

We are developing a system which will provide us with the capability of

quickly surveying and producing navigational charts of militarily significant coast lines.

The National Oceanographic Instrumentation Center will be in its second year of operation. This center is funded, manned and managed by the Navy with policy guidance provided by a seven member advisory board composed of representatives from DOD, Commerce, Interior, Transportation, NASA, NSF and Smithsonian.

Oceanographic Operations in support of the Fleet will include continued hydrographic surveys. The last of the military-manned coastal survey ships, USS MAURY, TANNER, and SERRANO were phased out this year. Their MSTS-manned replacements, USNS CHAUVENET, HARKNESS and WYMAN, will be shaken down in FY 71.

Ships in support of POLARIS/POSEIDON and MINUTEMAN III will continue surveys resulting in charts derived for hundreds of thousands of track miles of data in the deep ocean and waters off the continental U.S.

Oceanographic surveys in support of ASW will continue in the Atlantic and the Pacific. The USNS WILKES, our third MSTS-operated oceanographic survey ship, will become operational in late FY 71 to replace the recently inactivated USS REHOBOTH.

Cooperative surveys underway with Japan and Korea, and a third effort, with Norway, is about to commence. A delay in the delivery of the new construction ships which replace units recently inactivated will cause a temporary reduction in field surveys, but the required level of operations should be regained in the future.

I would like to speak especially to our oceanographic ship construction program. The Navy is continuing to develop a viable fleet of oceanographic research ships which can effectively support Navy objectives. These ships are primarily replacing overage converted World War II hulls, yachts and fishing boats that still comprise a significant portion of our research fleet.

Recently delivered to Scripps Institution of Oceanography for use in Navy programs was the 245-foot, 2,100 ton R/V MELVILLE (AGOR-14) which employs highly versatile cycloidal propellers for both propulsion and on-station maneuvering. Her sister ship, the R/V KNORR (AGOR-15) is currently completing construction and when delivered will be operated for the Navy by Woods Hole Oceanographic Institution.

Scheduled for delivery in 1971 as the final oceanographic research ship now under construction is the 3,000 ton catamaran-hull T-AGOR-16. This extremely stable platform will be used primarily by the Naval Research Laboratory in support of our underwater acoustics program.

The Navy budget contains a request for two of a new class of small (300 gross ton) utility AGOR. These small ships will make a major improvement both in terms of support capability and operating economy in meeting the needs of the Navy's coastal or short duration deep ocean projects. They will replace obsolete vessels that are becoming more and more expensive to operate.

We are planning to restore to service the 3 ships which budget restrictions required that we tie up last fall. These ships will serve Navy laboratories.

SPACE

Under Military Astronautics, which term identifies the Navy Space Program, there are two major efforts in Exploratory, Advanced, Engineering and Operational Development, which I would like to highlight. They are directed towards improving the Navy's capabilities in Satellite Communications and Navigation.

In the Satellite Communications Program in FY 1971, we intend to expedite development of reliable shipboard communication terminals. These terminals will be capable of linking ships at sea with each other and with shore facilities, through both the Defense Communications Satellite System DCSS and the Tactical Communication Satellites (TACSATCOM).

The Satellite Navigation effort is divided into two space related tasks. TRAN-SIT and TIMATION. The fiscal actions taken in the FY 70 appropriation in this area have had a serious impact on these programs. I would, therefore, like to take this opportunity to put these tasks in perspective, specifically as they relate to the considerations of a Defense Navigation Satellite System (DNSS).

In my statement last year I indicated that the TRANSIT System was operational and that the Navy was exploring the TIMATION technique. Four TRANSIT and two TIMATION satellites are in orbit.

In view of the concern expressed by the House Appropriations Defense Sub-committee that the Navy program is redundant to the Air Force study effort of the DNSS, I would like to address the relationship of TRANSIT, TIMATION and the DNSS. TRANSIT is currently operational, and must be maintained in an operational status for our FBM submarine force. It is desirable to incrementally upgrade the replenishment satellites to improve their utility, reliability, invulnerability and producibility. The TRANSIT Program has been limited to these efforts. It is expected that all these efforts will have a direct benefit not only to the optimization of the DNSS but also to the geodetic measurement programs.

TIMATION II, launched by the USAF for the Navy late last year, replaced TIMATION I. The techniques developed in this program will be applicable to

the DNSS.

In the DNSS area, the Navy is assisting the Navigation Satellite Executive Steering Group (NAVSEG) in its efforts to define a Defense Satellite Navigation System by providing design information on the limitation of various navigation systems, delineating the extent to which TRANSIT could be utilized, and developing system information which will describe the best utilization of the TIMATION ranging technique in a three-dimensional navigation system with near instantaneous fix capabilities. I would like to emphasize that the Navy has not proposed the expansion of TRANSIT nor the implementation of a Navy Navigation Satellite System based on TIMATION. We are studying these systems for wider application. The results of these studies are being supplied to the NAVSEG and DDR&E for incorporation in the DNSS effort.

ELECTRONIC WARFARE, COMMUNICATIONS AND COMMAND AND CONTROL

The major effort in shipboard electronic warfare has been directed against the anti-ship missile. To this end, a Ship Anti-Missile Integrated Defense (SAMID) program has been established to integrate discrete systems into a total ship system responsive to the command and control organization. By way of review, the SHORTSTOP system, phase I of the Ship Advanced Electronic Warfare System (SAEWS) project will interface directly with NTDS so that this important tactical information is immediately available to the force and ship decision makers.

The airborne electronic warfare projects are directed toward the self-protection of our attack and fighter aircraft, and to development of information gathering systems that will lead to a still greater capability to provide protection.

The Big Look Improvement Program (BLIP) was completed in FY 70. This program provided for update and evaluation of advanced signal acquisition and precision direction finding systems. These advanced systems will have applications in follow-on aircraft to be developed under the TASES program, discussed next.

Tactical Airborne Signal Exploitation System (TASES). The TASES program will provide for development of follow-on systems to replace current fleet EC-121M and EA-3B aircraft. The systems developed will provide the Navy with signal exploitation capabilities necessary for future tactical support of the fleet, and concurrently the capability to analyze and test performance and tactical employment of our own forces.

Airborne Electronic Warfare Jamming and Deception efforts include development of improved Electronic Warfare Countermeasures (ECM) systems for Navy attack, fighter and reconnaissance aircraft to increase their probability

of mission success and survivability in tactical operations.

We are continuing our efforts to provide improved communications equip-

ments and facilities for the various ship types in the fleet.

Communications Traffic Management and System Control facilities which are being developed, assembled and tested for installation in the USS Nimitz (CVAN-68), will consist of a Message Processing and Distribution System and a Facilities Control System. These integrated facilities will employ digital processors to assist human operators in the control of the ship's communication system and the handling of radio traffic through the application of on-line data processing techniques. R&D efforts in HF Radio Digital Terminal Equipment are being initiated in engineering development to provide high data rate digital communcation systems suitable for the long-range transmission of data required for automated data system applications. In the Ultra High Frequency spectrum, work is ongoing for the fabrication and comprehensive testing of advanced development models of the HARPY system for tactical communications. Follow-

ing the anticipated successful testing of these advanced development models on board ship and in an aircraft we plan to continue engineering development efforts in FY 71 for the design and fabrication of equipments for fleet introduction and evaluation of the system.

The major emphasis of our development program for Command and Control is the exploitation of digital computer technology to provide more comprehensive and timely decision information to Naval Commanders and to reduce reaction time through automated processing and exchange of information. These command and control systems may be categorized functionally as real-time combat direction systems and related families of tactical command data and

management information systems.

The Command Data Systems program in advanced development provides the technical base for the effective integration of new sonsors and additional tactical functions into the Navy's combat direction systems. The initial prototype model of a new third generation family of shipboard computer modules known as the AN/UYK-7(V) Digital Computer was delivered to the Navy this year and is undergoing performance testing. We have also commenced developments in computer programming and the related software system necessary for the desired operational application and exploitation of the AN/UYK-7(V) processing system. This computer is now planned for data processing and control application in the LHA, DXG(N), SSN, and AEGIS Missile Programs.

Development of a Junior Participating Tactical Data System is continuing in order to provide a small size Naval Tactical Data System of standard configuration but of limited capabilities. This system will be backfit installed during overhaul in the smaller AAW and ASW escorts and will permit the rapid exchange of tactical information with other tactical data systems over a com-

mon digital communications link.

The Joint Advanced Tactical Command Control Program provides the development work for the design and testing of data system interfaces. As automated tactical data systems are conceived, developed, and implemented to meet individual needs in each of the services, it is realized that there are facets of tactical information in each system which can provide mutual benefit to other units. In order to achieve the collective advantages of automated systems in a Joint Service Environment, the Joint Chiefs of Staff require that compatibility and inter-operability be demonstrated through actual tests and exercises of those systems which may be used in Joint Operations.

The Integrated Flagship Data System program is continuing with the assembly, functional system tests and installation this year of a prototype system in USS Providence (CLG-6). This will provide an automated data processing capability for the numbered Fleet Commander. We expect to conduct at-sea tests and fleet evaluations on this prototype flag-ship data system during FY

71.

We are continuing our efforts in the ASW Force Command and Control System leading to the development of an ASW Force oriented integrated system planned for the mid 70's. We expect to complete the definition of the integrated system

design concepts with the funds we have requested in FY 71.

The continuing increase in demands on the available communication channels for all classes of message traffic, including analog and digital data, prompted us to analyze more critically the need to send messages electrically, examine message characteristics and flow, and the effect of the transmission medium. A study has been initiated to determine to what extent changes in procedures, routing and message formating influence the capacity of the system. Promising solutions will be experimentally tested to assess the best techniques for reducing system response time, increasing its utility, and its capacity.

IV .- CONCLUSION

This, Mr. Chairman, completes my verbal presentation highlighting the FY 1971 Research, Development, Test and Evaluation, Navy request. I have tried to relate our program more nearly to Navy missions and responsibilities than has been done in the past. I have attempted to present to you, how we gear our efforts to fleet requirements and how we propose to provide the equipment and weapons systems to carry out these requirements.

We respond to emerging challenges but we must also anticipate future challenges with research and the enlargement of our technological capability. Only in this manner can today be met without sacrificing tomorrow. The Budget before you will permit the Navy to confront the challenges of today and the future. Mr.

Chairman, I request our support for this budget.

RESEARCH AND TESTING BEFORE DEVELOPMENT

Chairman Stennis. Now, one thing that we discussed yesterday quite a bit, and with the other services on previous days, is that it seems to us in the past we have rushed too swiftly from R&D on into procurement, and I mean procurement beyond your models or prototypes or whatever you may call them. I hope the committee can gradually develop a policy on that. I think the House committee is interested in the same thing.

Now, you represent that part that takes place before we get to this major procurement that I am talking about. Mr. Packard said "fly before you buy." As I interpret that, it means going on through the proto-

type testing and then go to the procurement.

Now, what is your comment on this idea of getting the bugs out? I think the military has got to have a firmer policy on it. I can see the natural inclination of everybody wanting to get weapons as fast as they can.

Dr. Frosch. I think, Mr. Chairman, that the policy of testing real hardware before you commit yourself to large-scale production is an extremely wise one. I think it is clear that we have not always carried

out that policy as wisely as we should.

I don't think that this always means that we should build and test a complete system before we begin to buy it. I think sometimes it is impossible to do that. But certainly we should, if we make the choice that we are going to produce, make it on the basis of solid test results and make it consciously knowing whether there are any risks and

what they might be.

There are some kinds of complicated systems in which, if you try to make too big a gap between what you might call the end of development and the beginning of production, you can find yourself in the great difficulty because during the gap the very people who have understood how to do the engineering for the development and who are vital to understanding the beginning of production can be lost to the program. Because of this, what one sometimes wants to do is to begin a very slow rate production, as late as possible in the testing cycle, so that if something goes wrong the risk is minimized because the right people are still there to help solve the problems. The production rate can then be increased as the confidence in the product increases.

There is another aspect to that, and that is for many of these systems, the key question at the end of development is not can we build it in principle. We may know that from our tests, but we may still have the question, yes, we can build it in a laboratory model shop but can the manufacturer build it on a production line at a high rate? In that sense even the beginning of real production can be considered to be also the end of development and that one is working the bugs out of producing a reliable, maintainable product on the production line. I think we need some ingenuity in figuring out the right kinds of contractual and management relationships to make this transition from development through testing and initial production to avoid some of the problems we have had in the past.

Chairman Stennis. We have the Army, Navy, Marine Corps, Air Force and all have these programs of weapons. It is important to have modern weapons, highly important, and naturally you are all pushing

for getting into procurement, that is, most times. Then we have the Secretary of Defense and his Assistant Secretaries. We are faced with all that. I think we have got to try to evolve something that would be a rather firm rule, and I emphasize there has to be acceptance.

Now, we need the help out of you gentlemen to get at this thing. I know Senator McIntyre has grappled with it and other members.

Senator Smith has many times.

Dr. Frosch. Well, Mr. Chairman, as I believe-

Chairman STENNIS. Can you give us a memorandum on this and then we will get someone to criticize your memorandum, and try to evolve a sound policy. I think we just have to.

Maybe we ought to make Dr. Foster the adviser on when procurement will start. I suppose he doesn't pass on that part very much,

directly, but in a general way.

Do you want to respond?

Dr. Frosch. Yes, certainly I might. Mr. Packard has been making a number of management changes and innovations that are designed to do precisely this. He has introduced the formal process of the Defense Systems Acquisition Review Council which must meet and agree that the next step can be taken at various milestones points in each program; that is, when there is a request to go into real engineering development or production of the kind that has substantial costs in it.

When there is a request for a transition from development to production, this group meets and it includes Dr. Foster, it includes Dr. Tucker, Assistant Secretary for Systems Analysis, it includes Mr. Moot who is the Comptroller, and it includes Mr. Shillito, who is

the Assistant Secretary for Installations and Logistics.

We have been gradually evolving, and I think it is becoming a very successful technique, the Development Concept Paper which tries to lay out what the agreement is between the service and OSD as to the costs that the development is expected to take, including milestones that are to be met before further progress and expenditure is allowed, and including cost, time, and performance thresholds which if they are breached are cause for major reconsideration of the

program.

Finally, we have been beginning to introduce some new contractual concepts, in particular the so-called milestone contractual concept, in which instead of tying production options or next stages in development to dates on the calendar as was our previous practice and still is, of course, for many contracts that were signed before that, so that when one came to an option we were frequently squeezed between either losing the option or taking a chance that it was all right to exercise the option even though the development wasn't far enough along, we have now moved to tying the next stage to the completion of the preceding development stage and not to a date on the calendar. All of these things should help.

Chairman STENNIS. All right. Thank you very much. I just say to the committee members that I think if we can keep on trying hard with the right kind of help we can evolve some kind of policy. We ought to have something better than the persuasion or pressure of the contractors on us at the last minute, maybe while the bill is in conference, as to how important a weapon is or how good it is. I

think we can improve on that.

All right. Senator Smith?

Senator Smith. I will pass for now, Mr. Chairman.

Chairman STENNIS. Senator McIntyre?

Senator McIntere. Since I expect to ask a lot of questions, why don't I yield to Senator Dominick at this time?

SEALAB III EXPERIMENTS

Chairman STENNIS. All right. Senator Dominick.

Senator Dominick. I just have a couple, Mr. Chairman, because I

didn't have time to get through this.

I was interested in what happened to SEALAB III, if you could enlarge on that. You refer to it on page 45 and call it the aborted SEALAB III experiment. What happened to it and what is being done in that area?

Dr. Frosch. We started to carry out the SEALAB and we placed

the HABITAT on the bottom near San Clemente Island.

Senator Dominick. For the benefit of the record how deep was that

to be?

Dr. Frosch. This was at 600 feet. There were some leaks that developed in cable "throughputs" in the SEALAB so that there began to be some leaks of helium, the atmosphere in it being a mixture of helium and oxygen. Helium has a great tendency to leak through nearly everything. So the divers went down to repair that and to enter the SEALAB and make it ready. In one of the dives, one of the divers suddenly collapsed and when brought back to the surface under decompression, later died.

We ran a considerable investigation of what had happened and in the course of this decided that some of the environmental characteristics of the system for protection of the divers needed further work, in particular the arrangements for keeping the divers warm because they are immersed in water at about 30° F. or a little less, while the divers could work, that protection was not really sufficient.

We also learned that there were some things on the HABITAT that weren't satisfactory, particularly the throughputs, and so-

Senator Dominick. Particularly the which?

Dr. Frosch. The penetrators that the electrical cables go through

from outside and inside. And so we took two series of actions.

One was to rework some of the engineering on the HABITAT and, two, to completely revise the diving program so that instead of going initially to 600 feet to work up to that depth with all the equipment at a slower rate starting at shallower depths and work our way down to 600 feet and be completely sure that we had everything totally tested at all the intermediate depths before we went to 600 feet.

Senator Dominick. Did the diver die from helium or from-

Dr. Frosch. No. The diver appears to have died because somewhere in the checkout procedures, the container of baralime, which is the material that absorbs the excess carbon dioxide from his breath, was either not replaced or was defective, so that his diving gear simply didn't have the right breath absorption characteristics.

There was disciplinary action taken in the case and in addition, all

of the checkout procedures have been completely reworked.

Senator Dominick. The other question I have is briefly your [deleted] satellite, I gather it is a satellite. You are talking about [deleted] and I think it is a satellite system.

Do we need that in addition to what is already being done by way

of [deleted] satellites or is this a duplication?

Dr. Frosch. No; this is not a duplication. This is rather different. What the Navy is doing is trying to build the [deleted] that could be used for [deleted] from the satellite [deleted].

Senator Dominick. Well, doesn't the [deleted] satellite now-won't

they [deleted]?

Dr. Frosch. I know of no technology now in use other than [deleted that can [deleted]. There is no such system in our operation that

Senator Dominick. Is [deleted] better than [deleted]?

Dr. Frosch. Yes, [deleted] is inherently limited to a rather small [deleted], while [deleted] are not area limited. In addition, [deleted], so that one can [deleted]. We are now in the stage of developing a [deleted] that can first be tested on aircraft. If it proves successful when evaluated from high altitude aircraft, then we will consider a satellite version. I might note that any such satellite system would, of course, be launched by the Air Force as the agent for the DOD.

Senator DOMINICK. What is the difference between that kind of

activity and the Transit and Timation systems that you are working

Dr. Frosch. The Transit is effectively operational and both Transit and Timation are [deleted] systems. Here one is using the satellite to help a ship or a submarine at sea find its position by processing satellite signals that can be converted into position information.

Senator Dominick. Thank you. Chairman Stennis. Thank you.

Senator Schweiker?

COMMITTEE PROCEDURE

Senator Schweiker. Well, do you want to take action on the other matter before we leave? I will yield my time if you want to.

Chairman Stennis. All right. If it is agreeable to the committee

we will reassemble at 2:30.

Senator Thurmond, we have just a few minutes here. We are going to vote in the Senate at 12. We want to pass the nomination.

Do you have a quick question you want to ask now?

Senator Thurmond. Well, I have several questions, so I will pass

Chairman Stennis. Well, gentlemen of the Navy, we thank you very

much. We will resume at 2:30.

I am going to ask Senator McIntyre to take the chair at 2:30. I will be here as a matter of interest part of the time, but I have some pressing matters.

All right. If you will excuse us, gentlemen, now, we will see you at

2:30. We will have an executive session.

(Whereupon, at 11:55 a.m., the committee was recessed until 2:30 of the same day.)

(Afternoon session, 2:30 o'clock, Thursday, March 19)

Present: Senators Stennis (chairman), McIntyre, and Thurmond. Of the staff of the Committee on Armed Services: T. Edward Braswell, Jr., Chief of Staff; and Labre R. Garcia, professional staff member.

Of the staff of the Preparedness Investigating Subcommittee: Hyman Fine and Ed Kenney, professional staff members.

DEPARTMENT OF THE NAVY

OBLIGATIONAL AUTHORITY

Senator McIntyre. Before we start the questioning, Dr. Frosch, I believe that we should try to keep our answers as succinct as possible. Then if you feel later on that you have not really done justice to the committee, you retain the right to elaborate on it for the record. I do not mean by that to tell you not to answer the questions as completely as you think, but we are going to be back here tomorrow, I assure you, if the answers get any longer than some of the questions.

STATEMENT OF HON. ROBERT A. FROSCH, ASSISTANT SECRETARY OF THE NAVY (RESEARCH AND DEVELOPMENT); ACCOMPANIED BY REAR ADM. E. A. RUCKNER, DEPUTY CHIEF OF NAVAL OPERATIONS (DEVELOPMENT); REAR ADM. T. B. OWEN, CHIEF OF NAVAL RESEARCH; REAR ADM. T. D. DAVIES, DEPUTY CHIEF OF NAVAL MATERIAL (DEVELOPMENT); AND MAJ. GEN. L. METZGER, DEPUTY CHIEF OF STAFF (R.D. & S.), U.S. MARINE CORPS—Resumed

Senator McIntyre. The first question we want to ask is, Do you consider, Doctor, your request for new obligating authority for fiscal year 1971 in the amount of \$2,197.3 million to be adequate to support a balanced research and development program consistent with overall Navy program objectives?

Dr. Frosch. We consider it to be adequate to cover the essential

things that we need to do.

Senator McIntyre. Dr. Foster, in his appearance before the committee, expressed serious concern regarding the declining trend in overall Department of Defense R.D.T. & E. appropriations. He explained that the three services were given higher allowances for R.D.T. & E., but that they were only able to support these levels within their overall ceilings. Would you recite Navy experience in this matter?

Dr. Frosch. Yes. The original suggested target from D.D.R. & E. was somewhat higher, and we can put into the record precisely what

it was. When the Secretary and the CNO began to work on the overall budget, it became clear that they had to make some choices between maintaining and operating sides and doing all the R.D.T. & E. that we would like to do. So we ended up with a somewhat lower amount than originally discussed.

Senator McIntyre. How much lower was that, do you remember?

Dr. Frosch. I will have to find the original one.

Senator McIntyre. Can you furnish that for the record, exactly? Dr. Frosch. Yes, we can furnish it for the record.

(The information follows:)

The original fiscal year 1971 target figure suggested by D.D.R. & E. \$2,445 million or \$248 million higher than the President's budget.

IMPROVED PROGRAM DEVELOPMENT

Senator McIntyre. If any lesson is to be learned from programs such as DYNASOAR, SKYBOLT and MOL, where billions of R.D.T. & E. dollars were spent prior to cancellation, it should be to realistically estimate at the outset what the cost will be, and if technology is sufficiently advanced to provide a reasonable degree of confidence in attaining program objectives. What is the Navy doing to avoid these pitfalls?

Dr. Frosch. Well, I think the only thing that one can do is proceed carefully and at a pace that enables one to solve the technological problems and test before you commit yourself too far. I think we are

trying to do that.

I do not believe that very early in a long range development program, it is possible to make accurate estimates of what the final production costs are going to be. I think the best one can do is proceed very carefully, and as the development proceeds and more information is available, then to make the best estimates that can be made at the time.

To a large extent, the supposed overruns that are being discussed are comparisons of information late in the program with estimates that were made so early in the program that it is unrealistic to believe them to have been very good.

TORPEDO PROGRAM

Senator McIntyre. Well, incidentally, in looking at the MK 48 torpedo, we find that we have a Mod-0, Mod-1, Mod-2, and to a layman like myself, it seems we ought to kick the zero and the one and go with the two. The answers come back to us that the Navy feels that they want to keep both of these. They want the two competitions to go down to the very brink and then have the advantage of choosing the better one for production and perhaps even for production with competition. Would this be somewhat of an example of where you are trying to make certain that before you go into production of, what now looks like possibly by [deleted] a \$3 billion purchase cost? Would this be an example of where you are trying to apply the lesson that even though it is going to cost more to continue the R.D.T. & E. on these two instead of dropping one now, this ultimately will bring you a satisfactory weapon that will be reliable?

Dr. Frosch. Yes, Senator. We are applying two lessons. One lesson is that we are proceeding very slowly in the beginning of production on the Mod zero, so that we can make sure that it can be produced as a reliable weapon before we go into any high rate production. We are trying to maintain a hardware type of competition between Clevite and Westinghouse so that each of them will have produced a few torpedoes and we will then have what is referred to frequently in a kind of developmental slang as a "shoot-off" of the torpedoes, in which we will make up a fairly elaborate set of tests in which we can test both torpedoes and compare them and have the advantage of competition for price and quality.

In this case, I think we are most interested in competition for production price, to try to get the best product at the lowest cost. Our experience has been that when we can get this kind of competition on

a hardware basis, we get the lowest production costs.

Senator McInter. Well, that may not be the best example, but it occurred to me as I was asking the question that here is an example where, in my effort to try to save money, I might be missing the lessons of the past and not applying this test that we associate now with some of these programs that have gotten into such heavy expenditures.

Dr. Frosch. I think the MK 48 program as we have structured it is really a good example of "fly before buy." For example, we are on the MK 48 mod 0 just in the process of completing a fairly elaborate set of tests on preproduction prototype torpedoes. We have let this contract for long lead materials for about 50 torpedoes, which we will buy and which will be production-type torpedoes so we will have an idea of what they are like when they come off a real production line. Thus we will be in a position to look at real hardware before we finally get down to a large production buy.

Senator McIntyre. We will come back to the MK 48 later on.

MILITARY SCIENCE BUDGET INCREASE

Your estimate, Doctor, for fiscal year 1971 provides for increases in several budget activities and decreases in others. Among the increases is the budget activity for Military Sciences which reflects an increase from \$139.3 million in fiscal year 1970 to \$142.2 million in fiscal year 1971. Why are you asking for more money in fiscal year 1971 in this area, particularly in view of the criticism and specific reductions made by the Congress last year?

Dr. Frosch. I would like, if I may, to ask Admiral Owen, Chief of

Naval Research, to respond to that.

Admiral Owen. Sir, the very modest increase in military sciences really consists of a series of adjustments in our research program wherein we have taken those items that we feel are of less value to the Navy and reduced them and permitted slight increases in other important research elements that we feel offer promise to the Navy. The total increase of \$3 million is made up of some adjustments in defense research sciences; a \$700,000 increase in education and training, which is directed to improving our research in computer instruction and programed instruction of direct value to training people in the service; and finally, about a million dollar increase in the studies and analyses program, the major portion of which is directed to enhancing future Marine Corps capability.

OVERALL PROGRAM INCREASE

Senator McINTYRE. In examining the six categories which comprise your R.D.T. & E. program, it appears that the major change in emphasis as between the two fiscal years is a sharp reduction in your operational systems development amounting to more than 20 percent. On the other hand, Doctor, your categories of research, exploratory development, advanced development, and engineering development all reflect varying amounts of increases. Would you please comment on the significance of this dramatic change between the two years?

Dr. Frosch. Well, the distinction between engineering development and operational development is purely in the question of whether the system involved has already been designated by the Secretary of Defense as one which will be put into the fleet operationally or whether it is a system for which approval has been given for development but not approval—final approval—for procurement to go directly into the fleet. So that in part, this reflects a shift in the direction that the committee has been suggesting; that is to say, to not make premature decisions that things are to go into production.

This simply fits the fact that some of the systems that were in operational development have now reached the fleet and begun to taper off in their R. & D. requirements, or are at late stages in their development. POSEIDON is one, for example, which is in operational development where the R.D.T. & E. requirements are beginning to decrease

with the years.

On ther other hand, we have some programs in engineering development which in the earlier stage are consuming large amounts of money. I think this is more a shift that arises from the phasing of programs as they go through development into the fleet than from

anything else.

Senator McIntyre. In-house independent laboratory research, commonly referred to as the laboratory director's discretionary fund, is included as \$12.3 million which is somewhat below the level for fiscal year 1970. Will you explain what reason the Navy has for using these funds for purposes such as indicated by the titles of the following types of ongoing efforts: experimental and field studies on protozoan parasitic disease in Egyptian animals and man; nutrition of the sand rat in the development of diabetes; diabetes mellitus in the Ethiopian population; animal diseases transmissable to man in Ethiopia; constants in the solar system?

Dr. Froscii. Let me take them one at a time. I can put them in a

couple of categories.

Senator McIntyre. Why not respond to that for the record?

Dr. Frosch. All right; we can do that. Senator McIntyre. Off the record.

(Off the record.)

Dr. Frosch. Let me comment on the medical ones generally, and

we will deal with them specifically in the record.

We make a specific effort to study diseases in parts of the world where it is conceivable that we might have military operational problems, particularly if those diseases are ones that might be of military significance were we to go into an area. The best past example of the kind of problem we had was that within a few days of the landings in Lebanon approximately 50 percent of the people who went ashore had

contracted some form or other of local illness, most of them illnesses

that were a little bit strange to our U.S. medical practice.

In our experiences in Vietnam, we have had to deal with plague, with black water fever, and with a number of other diseases that are not normally met with in the U.S. practice. What we are trying to do is build up a kit of knowledge of diseases that we might run into so that we can either preinnoculate or at least know how to treat them on the spot.

Senator McIntyre. Well, that is a very satisfactory answer. But right now, in the tenor of the U.S. Senate, the thought that we may be involved in a land warfare in northern Africa does not aid or abet

the passage of the budget for these items.

Dr. Frosch. We are not suggesting that any such thing is imminent and we are certainly not suggesting that it is desirable. But we are saying that it is possible, and medical knowledge takes a fair amount of time to develop, and as long as we have an opportunity to develop it in peacetime, which is, incidentally, a fairly inexpensive business, we proceed to do so.

Senator McIntyre. I think we understand the problem. Dr. Frosch. Might Admiral Owen comment on those?

Senator McIntyre. Certainly.

Admiral Owen. Sir, you certainly indicated the question that can arise with regard to understanding research project titles. We recognize this and in our review of all research and exploratory development projects, we have insisted that the administrators retitle their project and restate their objectives so they will be clear to the layman and not to the scientist alone. I am sure this will resolve the problem of the Congress and the public with regard to understanding the purpose of the project.

Senator McINTYRE. Last year, one of the Senators continued to talk about the gammaglobulin thing in Thailand. I am sure that 75 percent of the Senate, if asked the question right now whether they think the gammaglobulin is an animal, a vegetable, or a vehicle, would probably flunk.

unk.
(The information follows:)

DESCRIPTION OF CERTAIN PROJECTS FUNDED UNDER IN-HOUSE INDEPENDENT LABORATORY RESEARCH

The overseas Medical Research laboratories of the Bureau of Medicine and Surgery carry on research on communicable disease in order to define problems of actual and potential military importance, problems of stress which affect military operations and unusual opportunities to explore problems of medical interest to the Navy Medical and general profession of the United States and the countries in which the laboratories are located. Four of the five titles cited are taken up individually:

(1) Experimental and Field Studies on Piroplasmosis Protozoan Disease of Egyptian Animals and Man. This project requries 0.1 professional man years and \$600.00. Most of the previous diagnosis of the disease in man have been immediately prior to death or at autopsy. Piroplasmosis (babesia) is rather common in animals in Egypt and the relation to disease in man is to be observed. If the problem turns out to have no potential relevance it will be dropped.

(2) Nutrition of the Sand Rat Psammoyms obessis in the Development of Diabetes requires 0.1 professional man years and \$100.00. The fat sand rat is one of the few animals that can be used for the study of naturally occurring diabetes. Naval Medical Research Unit No. 3 has been collecting these animals and shipping them to University Research Workers in the United States to promote research on diabetes. The purpose of the study is to determine ways of preventing diabetes developing in the time between collection and shipping.

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(3) Diabetes Mellitus in the Ethiopian Population. The Government of Ethiopia provides the Navy with its laboratory buildings in Addis Ababa. The incidence of diabetes is so high that this small epidemiological survey is of particular interest to the Ethiopian medical profession and can uncover facts important to Navy and other physicians in the United States. The project requires 0.1 man years and \$1,000.00.

(4) Zoonosis (Animal Diseases Transmissible to Man) in Ethiopia. The project requires 0.3 professional man years and \$5,000.00. It provides for a survey of exotic diseases which are locally important and such diseases as leptospirosis which has been a problem in Viet Nam. It will define problems of potential military

importance needing further investigation.

Constants in the solar system—The Navy relies heavily on the positions of celestial bodies in our solar system for precise navigation purposes. In order to conduct such precise navigation, it is necessary to improve our knowledge of a number of the so-called "constants in the solar system." These include such items as the masses of the planets, the equatorial radii of the earth and other planets, the mean distance of the earth to the sun and to the other planets, the velocity of light, etc. By observing the positions of the planets on a continuous basis and by observing the behaviour of artificial satellites which circumnavigate the planets, we are able to refine our knowledge of the masses of such bodies. This gives us better data to insert in the gravitational equations which are used to predict the positions of such bodies. Our navigational precision is thus being continuously improved.

PURPOSE OF INDEPENDENT EXPLORATORY DEVELOPMENT PROGRAM

Senator McIntyre. The Navy has a program entitled laboratory independent exploratory development which is understood to be similar to the previously mentioned program Laboratory Independent Research, but pursues the same philosophy with respect to the exploratory development conducted in-house. Neither the Army nor Air Force has such a program in their R.D.T. & E. appropriations. Since this represents a substantial amount of funds and shows an increase from \$10 million in fiscal year 1970 to \$13.1 million in fiscal year 1971 will you explain why this program is necessary in the Navy, recognizing that neither the Army nor the Air Force has such a program?

Dr. Frosch. Well, if I understand the way in which the Air Force operates its laboratories and the kind of laboratories they are, they are organized along entirely different lines from the Navy. The Air Force has laboratories that are organized in technological areas, whereas we organize ours principally according to military mission

areas.

Furthermore, the Air Force essentially bloc funds its laboratories, so that in a certain sense, the entire laboratory funding can be regarded as independent exploratory development or research, or most of it. We organize our laboratories in military mission areas and there, the principal ones are operated on what is called a NIF basis, a Navy industrial fund basis, in which they essentially get their money from various parts of the Navy establishment and other military departments, sometimes, in order to carry out an agreed upon project.

Now, we would like to encourage the laboratories to have some freedom to develop their own ideas for possible military systems, since in the past, this has proved to be an excellent way to get ideas, and so we fund them to a relatively small degree to have some discretionary money so that they can do some experimentation on their own ideas for

military systems.

It is out of such independent development in the past that we have gotten ideas such as the SIDEWINDER missile, which is probably

the most famous example, but there are others.

This is an area that Dr. Foster and I have discussed extensively. We feel that if anything, the Navy laboratories, at any rate, probably have too little independent exploratory development money, and we would like to increase it a little bit.

Senator McIntyre. You contrasted the-

Dr. Frosch. I am not as familiar with the Army laboratories system as I am with the Air Force.

Incidentally, I am not positive, but I believe the other two services do have independent exploratory development, although it may not be labeled as such, because I have certainly been in conversations where the three assistant secretaries were describing the same kind of program and the same kind of management problem, although we may not have it broken out in the budget in the same way.

(The information follows:)

The Navy Independent Exploratory Development (IED) Program was established as a separate line item in the FY 1970 budget. From its inception in FY 1965 through FY 1969 it was carried in other Program Elements of Exploratory Development; in FY 1969, for example, it was fractionated in 14 elements. It was consolidated into one Element to make the funds clearly identifiable, to centralize management responsibility for the program within Navy, and to increase flexibility in the use of the funds by removing the artificial boundaries created by other element definitions.

We understand the Army has an Independent Exploratory Development Program which is known as the In-House Laboratory Directors Fund and which does appear as a line item in the Army Budget. It is administered in a similar manner to the Navy program with after-the-fact review by the Office of the

Assistant Secretary (R&D).

It is our understanding that the Air Force does not have an Independent Exploratory Development Program per se. However, their entire exploratory development funding is allocated to and largely determined by their laboratories, such as the Air Force Aeromechanics Laboratory, the Air Force Flight Dynamics Laboratory and the Air Force Avionics Laboratory. Thus the nature of much of the laboratory effort is proposed by the laboratory, although it is subject to prior approval by Air Force Headquarters. The laboratory's missions are defined in broad technological terms.

In the Navy, our laboratories are oriented toward types of warfare or Navy missions. For example, the Naval Ship Research and Development Center is concerned with all aspects of Naval ships: propulsion, hydromechanics, ship silencing, and so on. The Naval Weapons Center, China Lake, as another example, deals primarily with air-delivered ordnance, including rocket propulsion,

missile guidance, warheads and fusing.

The availability of IED funds gives the Navy laboratory Technical Director the opportunity to exploit new ideas generated within the laboratory, allows him to initiate new work at the technologically opportune moment, contributes to motivation of his staff, and creates a favorable environment for innovation in technology. With these funds, the laboratory is also able to take a broader systems approach than it can under specifically-defined exploratory development sponsored by a System Command.

We are obviously sure that within the constraints on the total exploratory development budget, the funds devoted to the independent program are a key item in stimulating the sort of technical innovation that is the key to all our major advances. We have chosen to list this effort as a separate line item partly for the administrative convenience of the Director of Navy Laboratories, who administers and controls the distribution of this money, and partly to make clear, both

inside and outside the Navy, what is our intent for its use.

BUDGET INCREASE

Senator McIntyre. In addition to that, what about this increase? You are going from \$10 million in fiscal 1970 to \$13.1 in 1971.

Dr. Frosch. This will appear again in future years. This is part of a plan that Dr. Foster and I have agreed on to increase the fraction of our total exploratory development budget that is devoted to independent exploratory development. We believe that it should increase to a point where about 20 percent of the money that a laboratory spends inhouse should be independent exploratory development. What we propose to do by way of managing this is, as we get the program to the point we want it to be, to review in each laboratory annually the kind of accomplishments and things that have come out of the independent exploratory development and either increase or decrease the amount to that laboratory, depending upon the quality and success of the work.

(The information follows:)

Based upon actual accomplishments to date, we feel the increase from \$10 to \$13.1 million is justified. Under this program the Navy scientific community has been able to carry out good technical work in the absence of formally established requirements. For example, a fluorescent solution developed in an IED study of [deleted] mathematical models describing the dynamics of a ship propulsion plant and control system developed under IED are being used in the design study of DD963, and the principle of operation of [deleted] demonstrated under IED has been adopted for the [deleted].

These examples, while good, are in the nature of component or "black box" improvements. With the increased funding requested, new ideas could be advanced to the systems breadboard stage for feasibility evaluation. Greater latitude for innovation and consequent greater accomplishments should result.

Senator McIntyre. These laboratories are not all in-house, then? Dr. Frosch. The IED is the label for that money in "in-house" laboratories.

The independent exploratory development (IED) funds are allocated to Navy in-house R.D.T. & E. activities, primarily used to support in-house technical staff. However, in the course of conducting an independent project, a laboratory may require a particular skill or a particular piece of equipment not available in-house. In that case, the laboratory may use IED funds to contract for the skill or equipment required in the project.

MAKEUP OF FOREIGN MILITARY SECURITY ENVIRONMENT

Senator McIntyre. Last year, this committee was critical of and reduced the amount of funds requested for foreign military security environments, and policy planning studies. These were identified under the behavioral and social sciences programs. The committee report stated that some of these efforts should be taken over by other agencies such as the State Department and National Science Foundation. What has the Navy done about this and what amounts are in your fiscal year 1970 program and requested for fiscal year 1971?

Dr. Frosch. The foreign—are you asking about foreign contract

research or foreign area-

Senator McIntyre. I am asking about this foreign military security

Dr. Frosch. All right. Foreign military security environment constitutes one area—and policy planning studies another area.

For foreign military security environment effort, which was \$165,-000 in fiscal 1970, we are asking for \$150,000 in fiscal 1971-

Admiral Owen. That figure is correct.

Dr. Frosch. All right. The amount for policy planning studies has remained the same in our request in 1971 and 1970. The policy planning studies portion does not involve any overseas research. It is part of the funding of studies at the Center for Naval Analysis,

Senator McIntyre. The foreign military security environmentsthat does involve some studies taking place in foreign countries, does

Dr. Frosch. There is an amount of \$95,000 which is involved in the Marine Corps developments of combined action capabilities as they have applied it in Vietnam, and to continue doing that work in Vietnam and to work on how such concepts of operation might be useful if we have future continuing situations in which the Marines have

to operate closely with foreign populations and troops.

Senator McInter. I would like you to furnish for the record the individual projects and a brief description of them that appear in both these categories we have mentioned, the foreign military security environments and policy planning studies. This would enable me to handle any question about foreign military security environments money being spent overseas. Last year we were in (deleted). I don't think we had anything beyond that. But some of the gentlemen who vote against your appropriations and operations feel they are starting in other areas.

Dr. Frosch. We will supply that for the record. (The information follows:)

POLICY PLANNING STUDIES

Fiscal year 1969	\$ 549, 000
Fiscal year 1970	
Fiscal year 1971	961,000

These are estimated amounts that support the Plans and Policy Program of study done at the Center for Naval Analyses. The work is described below:

The Plans and Policy Program (P3) is comprised of a series of studies the objective of which is to examine the future world political and economic environment in order to identify tasks for which the Navy would be responsible in the 1975-1985 timeframe, and to relate these tasks to technological opportunities which develop. These studies are designed to provide inputs to the Navy Strategic Study and the Joint Long Range Strategic Study. The Program is a 10-man-year research effort.

Several proposed study topics are currently under consideration for Fiscal

Year 1971 Paresearch.

FY 1969 and FY 1970 funds also provided for the project "Navy Role in Exploitation of Ocean Resources." This study investigated the effects on U.S. Navy interests of future international oceanic arrangement and the problems of accommodation between Navy and expanding industry use of offshore areas. The study identified, enumerated, and evaluated factors vital to an effective, workable, and verifiably international agreement (deleted). To this end the study has been of great value in identifying interests and developing positions important to the Navy. In the area of conflicts arising from the use of offshore areas the study focus was on the (deleted). It is considered that this part of the study will provide background information essential to the understanding and resolution of conflicting Navy and industry interests, not only in the (deleted) but in other offshore areas as well. (Deleted.) No FY 1971 funds will be expended on this project.

FOREIGN MILITARY SECURITY ENVIRONMENTS

[In thousands of dollars]

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(1)	25	·
272	165	150
	94 58 45 8	17

¹ Active, but not funded in fiscal year 1969.

POLICY PLANNING

Senator McIntyre. That question is extended also to ask for the same break down for fiscal 1970.

Dr. Frosch. Yes, we can do that.

I might say the kind of thing that is involved in the policy planning studies if I indicate some titles. We will supply considerably more information.

For example, an assessment of the future [deleted] alliance is something which was completed. The crisis role of the 6th Fleet is something which is being looked at. Projections of the Soviet merchant marine fleet [deleted], U.S. strategic interest in the future [deleted]. These are the areas in which there is a direct naval interest and there is a desire to do some projection of what the framework might be in which naval requirements might be cast in the future.

Senator McIntyre. These would come out of your policy planning?

Dr. Frosch. These would be out of policy planning, yes.

DEFENSE RESEARCH SCIENCES

Senator McIntyre. Despite congressional criticism and specific cuts imposed in fiscal year 1970, you are asking for an increase of \$2.2 million for defense research sciences over the \$104.3 million appropriated last year. Will you explain?

Dr. Frosch. I think the Chief of Naval Research can answer that. Admiral Owen. Yes, sir. The increase in Defense Research Sciences consists of a net of ups and downs, there are decreases in nuclear physics, a decrease in the field of astronomy. There is increased emphasis, averaging about \$500,000 per subelement in the fields of chemistry, electronics materials, energy conversion, the Arctic, and finally, in Navy medical work. The interest in the Arctic and Navy missions there required extension of our effort at the Naval Research Laboratory.

In the field of medicine, we are concentrating on underwater medicine, on continuation of our efforts in wound repair, and the study of shock as it relates to casualties experienced in Vietnam by either our

Marine Corps forces or our aviators.

In chemistry, we are interested in the field of chemical [deleted] and advances in our capability to develop boron polymers for structural

purposes.

In the field of electronics, we are worried about increasing our capability [deleted] we are interested in direction finding antenna improvements, and in the development of thin films and their contribution to data processing. Similarly in the other areas, we have specific

reasons for asking for these modest increases, sir.

I would point out that in the years that have passed since 1965, in which we asked for a budget of about this same level, we have had to absorb considerable pay increases, sir. We have enhanced our effort in the field of oceanography. We have increased our support of the inhouse laboratory independent research item, and we have taken on a rather substantial program of support of the DOD Project THEMIS. So the absolute magnitude of the work is substantially less than it was in previous years.

Senator McIntyre. There is every assurance to the Congress that your work in these fields—now just take, for instance, you mentioned shock in a casualty.

Admiral Owen. Yes, sir. Senator McIntyre. Your work on behalf of the Marine Corps and your own personnel is closely integrated and is done with complete knowledge of the other services who may be operating in the same area?

Dr. Frosch. Yes; I think that is correct, Senator. Senator McIntyre. There is no doubt about that?

Admiral Owen. None, Senator.

Dr. Frosch. I have been to the Navy Medical Research Institute and talked with the physicians there, and they are very well coordinated not only with the other services but with other civilian programs which have similar types of problems.

Senator McIntyre. Good.

PHASEOUT OF PROJECT THEMIS

Does your estimate, Admiral, include any funds for project

THEMIS, the university program?

Dr. Frosch. Yes, it does; in the amount of \$7.4 million. However, we no longer carry THEMIS as a separately identified element. The effort is looked upon as being a part of the regular research program and is being judged accordingly, sir.

Senator McIntyre. THEMIS, in and of itself, is being phased out:

is it not?

Dr. Frosch. As a separately identified element of the research program; yes, sir. The efforts will continue on their own merit as part of the regular research program.

Senator McIntyre. Defense to university?

Dr. Frosch. Defense sponsorship of university research related to Navy needs.

SECTION 203 CONTINUATION

Senator McIntyre. You state, Mr. Secretary, that you are following the intent of section 203 of the fiscal year 1970 Military Procurement Authorization Act relative to relevancy to research. Dr. Frosch, when he appeared before this committee, stated that some benefits were being derived by the Department of Defense as a result of this section. He also said that if a similar provision is not included in the fiscal year 1971 act, he expected the Department of Defense to continue with the

same policy. Do you agree with him?

Dr. Frosch. I think we have always had a policy of insisting upon relevance. In order to comply with 203 in detail, we ran a complete review of a project-by-project review, of all of the research work, and each individual project was looked at with regard to relevance. As a result of this, some percent of all of the projects, it was agreed, were marginal, at least with regard to direct and apparent relevance. That was the percent in number of project. The amount of dollars that this represented in the program was about 3.8 percent of the dollars. These were mostly very small programs.

So those are being terminated where appropriate. We would con-

tinue this kind of review.



I would add that I have some concern that this kind of a requirement has a tendency to grow in the direction of becoming ever more rigid and could eventually be damaging to the research program.

PLANS FOR AIRCRAFT PURCHASE BEFORE DEVELOPMENT

Senator McIntyre. Senator Thurmond, would you like to inquire at this point?

Senator THURMOND. Thank you.

Secretary Frosch, last year the Navy asked the Congress to approve six F-14s for R. & D. and six F-14s for production. This was fully 2 years before the plane was to fly that you were asking for six F-14s with PAMA money. I believe the Congress refused to approve the six F-14s with PAMA money, but approved 12 F-14s for R. & D. Is that correct?

Dr. Frosch. That is correct.

Senator Thurmond. This year you are asking for \$517 million for 26 production aircraft, although the first R. & D. plane is not scheduled to fly until January 1971. Why are we buying before we fly?

Dr. Frosh. Well, the planes in production would, of course, not be completed until well after the flying and testing of the first aircraft.

The problem, Senator, is this: If we wait to order any production aircraft until after we have completed the whole test program, then we will have introduced a major gap between the developmental and the production part of the program. The engineers and people who understand how to construct the airplane will not have been doing anything for a period of time, and we believe that this would bring about a major increase in cost and lead to trouble in the early portion of the production. The contract for the F-14, as I believe has been testified to before, is on a lot basis. The 26 that you mention is the planned number in the first lot. We could buy as few as 15, or as many as 45 in that lot. If we do not begin the long lead procurement, then the program is very much stretched out at increased cost.

Senator Thurmond. Thank you.

PAMN REQUEST AS RELATED TO R. & D. BUDGET REQUEST

Now, Mr. Secretary, I also note that you have \$274 million in R. & D. requested for fiscal year 1971 along with your \$517 million for procurement, for a total of \$791 million in fiscal year 1971. I am concerned about this concurrency, so please explain the PAMN request as it relates to the R. & D. requests.

Dr. Frosch. The permanent funding, as mentioned, would be for the beginning of the first production buy. The R.D.T. & E., of course, is for the continuation of the aircraft for research and development and for test, those first 12 aircraft. If we do not begin to buy production aircraft then we will find ourselves at the end of a development program ready to go into Board of Inspection and Survey Tests and OPEVAL, both of which are prerequisites for the plane going to the fleet, without having any planes to do BIS testing or the OPEVAL.

Senator Thurmond. Is it true we are dealing with an advance in the state of the art with the F-14 and therefore, we are dealing with

many unknowns?

Dr. Frosch. I think we are dealing with an advance in the state of the art for that type of aircraft. We believe that the unknowns, the situations in which there might be unknowns are being systematically investigated. For example, in this program, all of the structural details which might be a matter of concern, such as the wing box structure and the pivot structures, will have been completely tested in sections and complete assemblies made by production methods before the first flight of the first airplane. So we have a very systematic program to work out the possible unknowns before we fly.

Senator Thurmond. Are you familiar with whether that was done

on the F-111?

Dr. Frosch. My recollection of the F-111 is that the R.D.T. & E. airplanes were flying and, in fact, there were aircraft in production before that testing was complete.

SOUNDNESS OF RESEARCH PROGRAM

Senator Thurmond. Mr. Secretary, did you know that the French built only one Mirage jet for R. & D., and it crashed; so they had to wait 6 months to get another to test before going into production?

Dr. Frosch. I was not familiar with that fact.

Senator Thurmond. This appears to be an austere approach by the French, but the result was a fine aircraft in the Mirage.

Secretary Frosch, do you agree with such an austere approach as

the French have employed here?

Dr. Frosch. I think if one is willing to take a longer period for development and if one is willing to give up a lot of systematic engineering that we do because we believe it eventually gets us an airplane which is more reliable and more maintainable and with cheaper logistics system, then one can go to that kind of an arrangement. It is an alternate way to do engineering.

We have generally felt that, for the number of aircraft we have to operate and the size of our fleet, it would give us a product which was

somewhat harder to maintain and operate in the fleet.

Senator Thurmond. Mr. Secretary, we might be able to learn something from the Boeing Aircraft Co. and their handling of their own commercial development contracts. For example, they built only one 707 test plane, or R. & D. plane, before production of this aircraft. Regarding the 747 plane, they built five, because this aircraft did not push the state of the art.

On the SST contract, they are now undertaking to build only two test planes, as once again, they will be pushing the state of the art. Do you believe Boeing made sound decisions in staying in R. & D. on

these planes until the bugs were worked out?

Dr. Frosch. The 707 was in some sense, if I remember the history, a very easy airplane to develop from the point of view of the commercial version, because it is in fact, a mod of the KC-135, which

had already been developed.

There is another aspect to the difference between the military and the commercial practice. We need more airplanes for tests because we have a very much broader flight envelope to test in over a larger speed range, both subsonic and supersonic, and a much higher set of maneuvers to perform which higher g. loadings. We also have weapons to test and a much more complicated avionics system to test. So we need more airplanes so that we can cover that much of a test program.

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F-14 BUDGET REQUEST BREAKDOWN

Senator Thurmond. Mr. Secretary, the Navy still has \$426 million to go in the F-14 R. & D. Would you please outline this request, especially for funds for fiscal 1972 R. & D. and beyond? If you would rather do that for the record, that would be all right.

Dr. Frosch. I think that might be best for the record. Senator Thurmond. I thought it might be preferable.

(The information follows:)

The \$462 million remaining in R. & D. for the F-14-A is broken down as follows: Fiscal year 1971, \$274 million, fiscal year 1972 and beyond, \$152 million. These funds will be used to complete the R. & D. program for the F-14-A and will provide the 12 R. & D. aircraft previously mentioned. The F-14-A engineering development program now in progress will continue in fiscal year 1971 with delivery of the first F-14-A and first flight scheduled in January 1971. The 12 R. & D. aircraft are scheduled for delivery at a rate of one per month into fiscal year 1972. This schedule is necessary to meet the planned IOC in fiscal year 1973.

R. & D. PROGRAM FOR F-111

Senator Thurmond. I know the relation between R. & D. and PAMN planes is not as simple as my illustrations indicate it might be, but I am trying to see that this country gets the best possible planes at the least cost. Do you believe we stayed long enough in R. & D. with the F-111?

Dr. Frosch. As far as the F-111-B is concerned, I think the history is clear that we did not. I would hesitate to state with regard to the

F-111-A. I am less familiar with that program.

Senator Thurmond. We were urged to go ahead with the F-111 from R. & D. to production for cost reasons. If we had stayed in R. & D. our later modification costs would not have been hundreds of

millions. Do you agree?

Dr. Frosch. Yes, I think it is largely a matter of what the rate of production is. There are certain things that can be found out about an aircraft, or the production of anything only when you begin to produce them. What I would like to see is a very careful tailoring of the rate of early production so that it can be fitted with the end of the R.D.T. & E. and test program, and so that the early production can be used to work out the bugs and to give some time to work out any retrofits that might be required. Then the production rate should increase.

One other point needs to be made. That is that the aircraft that are used for board of inspection and survey tests, which are the acceptability tests, must be production aircraft, because that is what is being tested.

One of the purposes of the board of inspection and survey tests is to find out whether there are any items that require retrofitting. So in that sense, we must buy and must be in a tooling position to buy some production aircraft, even at a stage where we are beginning tests whose very purpose is to find out whether we have to make any changes before we go into high-rate production.

OPINION ON FEASIBILITY OF F-111

Senator Thurmond. Mr. Secretary, if we had stayed in R. & D. longer with the F-111, do you feel we would have some planes today which would fly full requirements?

Dr. Frosch. Well, that is a difficult question to answer, because I have to go back and estimate what my view was on fixing the problems that have turned up in the F-111, and I do not know that I am familiar enough with the problems the Air Force seems to have been having to do that.

Senator Thurmond. Was it such a bad design or designed to accomplish so many purposes that it was an inadvisable plane to start with? Maybe you would like to think over that and supply some more information for the record.

Dr. Frosch. I would like to supply information for the record. (The information follows:)

There is no evidence that a longer R. & D. effort would have resulted in a significantly improved design without relief of the constraints of a single airplane to meet the widely diverse missions, systems and basing requirements specified for the aircraft.

Senator Thurmond. Why does the Navy need only 12 F-14 planes for R. & D. and the Air Force needs 20 F-15 planes for R. & D.?

Dr. Frosch. I cannot really answer that, because I do not know the detailed logic of the F-15 development and test program. We have worked out very carefully a series of test for the F-14 and its systems. We believe that the 12 aircraft can do that test program. I do not think it gives us any, very many if any, spares in case we get into trouble in the test program, but I think it is adequate. I cannot speak to the F-15 program.

TESTING RESULTS AND LENGTH AFFECTING PRODUCTION SCHEDULE

Senator Thurmond. Mr. Secretary, it appears the aircraft industry are rather conservative when their own funds are involved. Further, these planes Boeing built were for passengers and far less complex than the military planes. Do you feel the more complex the plane, the

longer it should stay in R. & D.?

Dr. Frosch. Certainly it is the case that the more complex the plane is, the more R. & D. work has to be done. There is a rather complicated trade off between the time it takes to do the development and how many development airplanes need to be built. Generally speaking, if it is more complicated, it is likely to take more test airplanes, and perhaps more time in development and tests.

Senator Thurmond. Mr. Secretary, you say it is better not to go into production until you get solid test results. Do you feel you get solid

test results before you conduct flight tests of a plane?

Dr. Frosch. You get some kinds of very solid test results. For example, one should know before you go into flight testing the structural factors of the aircraft very well. One certainly does not have any thing like final information on aerodynamic factors.

Senator Thurmond. Mr. Secretary, what advantage do you see from going into production before R. & D. is completed, other than getting

your plane to the fleet that much earlier?

Dr. Frosch. Well, Senator, I would say that I do not believe for these military aircraft that it is possible or meaningful to say that we are going to complete all and then to ask for the funds to start production and then go into production. I believe if you do that, you introduce such a long gap between development and beginning of pro-

duction that the essential skills that are required for going into production will be lost from the producer's plant.

Senator Thurmond. In other words, you are convinced of the success of the plane and feel that the saving of time would be served?

Dr. Frosch. I think it is more than time. I think it would be difficult to be sure you could get the same plane into production that you had developed if you put that large a gap in. But I think we have to be careful that the rate at which we push the production on toward the end of development is such that we do not have an excess risk either of funds or of requirements for retrofit in case certain things have to be changed.

SOFT TOOLING VERSUS HARD TOOLING

Senator Thurmond. Would you explain the difference between soft tooling and hard tooling and the rate production as it applies to the

F-14, or would you prefer to answer that for the record?

Dr. Frosch. I will go into it in more detail for the record, but one of the things that has happened as we have gone to higher performance aircraft and more elaborate production techniques is that the distinction between soft and hard tooling has effectively vanished. It is impossible to set up soft tooling to do, for example, the electron beam welding on the titanium wing box for an F-14. If you are going to build that plane by that technique that you want to test, you effectively have to build at least one set of producion tooling. That is true of most of the jigs and fixtures. There is a distinction between hard tooling and rate tooling, for hard tooling in the sense that I just described, you might build just enough to build one airplane or a few airplanes. If you want to go to production lines, you might have to duplicate the tooling a number of times.

PRODUCTION PLANS FOR THE F-14

Senator Thurmond. Mr. Secretary, why does the Navy say it would cost us more if we do not go into production and authorize 26 F-14s this year? I wonder if that was the same line of thought that was

followed on the F-111.

Dr. Frosch. No; I think the logic is the following: If we do not have production money so that the production engineers and the people in the factory can begin to work at the appropriate point, then we have to either let the engineers who should be doing the design work for production, working with the engineers who are doing the development, go from the factory and lose the skills, or we need to fund them to retain them in the program, even though they are not doing any specific work for the interim period before production starts. That appears to clearly cost money.

Senator Thurmond. How much leeway does the F-14 contract permit the Navy in proceeding with the number of production planes

or R. & D. aircraft?

Dr. Frosch. The lot 3 production buy can be as low as 15 aircraft or as many as 45.

Senator Thurmond. Did you finish your reply?

Dr. Frosch. Yes; I did.

Senator Thurmond. Mr. Secretary, I want our Navy to have the best planes in the world as soon as possible. That is the Navy's goal

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also, of course. Do you have any further comment on my line of

questioning?

Dr. Frosch. Well, I think the line of questioning hits directly at an extremely complicated and difficult area. This is the question of, at what point should one begin to risk production money as a way of continuing a program in an orderly way? We are always between two difficult kinds of decisions. We would like to complete all testing, then look at the object very carefully, and then begin to do production. But we frequently find that if we structure the program that way, we are taking some other risks that are unpalatable, the risks that we would no be able to produce the plane that we have developed in an orderly way, and so we would lose money that way. Also there is the risk that we might stretch the program out so long that the product we have developed is obsolescent or obsolete by the time we decide to produce it. These have to be balanced between the risks of an expensive retrofit program.

Senator Thurmond. Thank you very much, Mr. Secretary.

We are glad to have you with us.

Thank you, Mr. Chairman.

Senator McIntyre. Thank you, Senator Thurmond.

ADEQUATE IMPLEMENTATION OF R. & D. FUNDS

Mr. Secretary, there appears to be a misunderstanding on the part of the military services concerning congressional intent in enacting section 203 relating to research. It was not intended to reduce the level of essential research, but rather to have nondefense agencies undertake that research which clearly has no direct or apparent relationship to military requirements. Don't you agree that if the budgets for those civilian agencies were increased accordingly, the Nation would be essentially in the same position as if the funds were in the DOD budget?

Dr. Frosch. Provided we were careful not to have to cut any research out of the defense research budgets that are required and necessary and relevant to the military purposes, I think that is essentially

correct.

Senator McIntyre. Do you have any ideas how Congress can implement this? How can we get these other departments to be more aware of the need for research in these areas that we find in the mili-

tary services, and for which we are severely criticized?

Dr. Frosch. Well, with regard to the scientific and engineering research in the physical and biological sciences, we maintain pretty close liaison with the National Science Foundation through the Office of Naval Research. So they are made directly aware of those things we find that we have been sponsoring for reasons of general interest, but which do not fit under 203, so they know our general interests in this area.

Senator McIntyre. But do they pick them up and start studying them if you bow out?

Dr. Frosch. I think they have not been doing that generally, because they have not had a sufficient budget to do it in terms of their priority structure.

One of the difficulties is that the priority structure that we might see in science from the point of view of our military mission interests may well be different than the priority structure that the National Science Foundation, with its charter for basic scientific support, might see. So that our view that something is important for the future might not be quite the same as theirs.

I think one way might be to look at the things that need to be cut out of our budgets and increase the NSF budget by a correspond-

ing amount.

Senator McInter. Don't you think that the influence of the Office of Science and Technology could be exerted with a great deal of impact in this area?

Dr. Frosch. Well, they certainly can and do try to coordinate such

things. I think they could be very useful in this area.

COST SHARING OF LARGE SURFACE EFFECT SHIPS

Senator McIntyre. Your statement indicates that the development effort aimed at large multithousand-ton surface effect ships, for which you are requesting an increase from \$7.9 million in fiscal year 1970 to \$20 million in fiscal year 1971, has become primarily a Navy-oriented program due to the reduced participation of the Department of Commerce. When this program was reviewed by the Research and Development Subcommittee it became clear that this reduced participation by the Department of Commerce was not consistent with the longstanding agreement between that agency and the Department of Defense which provided that there would be equal sharing of the cost for the development of these ships. As a matter of fact, that agreement was represented by equal contributions of \$3.8 million in fiscal year 1968 and prior years, and \$3.3 million in fiscal year 1969 by both agencies. In fiscal year 1970 the Navy is providing \$10.4 million and the Department of Commerce only \$1.5 million. For fiscal year 1971 the Navy is requesting \$20 million and the Department of Commerce has included \$500,000 in its budget. Since this program has perhaps greater potential benefit to commercial shipping than to the Navy, it is not understood why the original agreement was not continued and costs shared equally. Would you comment on this situation?

Dr. Frosch. Well, the Department of Commerce and the Maritime Administrator wished to continue to do so. In fact, I conferred with them and with the joint project manager on a number of occasions, both with Mr. Gibson, the Maritime Administrator, and Dr. Tribus, the Assistant Secretary for Research and Technology. I believe it is fair to say that in the end, the Bureau of the Budget felt that the commercial prospects for such usage were not sufficient for it to be in the Commerce budget and they so recommended, although the appropriate officials in Commerce still wanted to proceed with it.

The argument was that the prospects for commercial economic use were insufficiently profitable for it to be a worthwhile bet and that Commerce could spend money on more near term research rather

than this long term research.

In my view, it is essentially impossible to make a really good economic prediction for a transportation system that has not yet been designed and will not be around for 10 years to make that kind of decision at this point in the program.

Senator McIntyre. Yet you are asking this committee, the full committee, and the Congress to fund this for \$20 million. You certainly

would not blame me if I recommended to the full committee that this program be scratched, if only for one thing, to raise this point.

Dr. Frosch. Well, that would be a very useful thing to do from a governmental organization point of view, perhaps. But on the other hand, there is, we think, a valid and major interest in the development of such ships for naval warfare purposes which can stand on its own. I think even if we had nevr had the idea of joining with Commerce jointly to develop it, we would have proceeded in the Navy and would, in fact, be requesting the continuation of this program.

We thought when the program was started with Commerce that it would make a particularly strong program to share it equally. It has turned out to be a weakness in the program, but I think that should not be allowed to detract from its importance for the future of naval

vessels.

PROGRAM ELEMENTS IN ASW SENSORS DEVELOPMENT

Senator McInter. You mentioned that in antisubmarine warfare the second area of importance is the development of better acoustic sensors for all ASW platforms. Will you provide a list of all of the program elements involved in this area for fiscal years 1969, 1970, and 1971 with a brief explanation of the interrelationship among them. Include also for the record a discussion of how these are all directed toward specific Navy operational requirements.

Dr. Frosch. Certainly. We will provide that for the record.

(Information is on page 1583-1584.)

COST SHARING OF OCEANOGRAPHY PROGRAM

Senator McIntyre. You state, Mr. Secretary that the Navy's program in oceanography continues to represent about one-half of the total Federal effort which reflects the importance of oceanography to military operations. Do you believe that the Navy is bearing too large a share of the cost of these very important efforts, and that in view of the pressures on the total level of defense spending, the objectives of this field of science may be better served by encouraging other governmental and perhaps private agencies to increase their level of support? This possibly could be done through the National Science Foundation with the assistance of the Bureau of the Budget.

Dr. Frosch. Well, we are doing the oceanography which is directly

connected with necessary support to naval missions.

I believe that the fact that it turns out that we are doing half of the national effort does not mean that in any sense, we have taken half the job on, but only that the piece we need to do which turns out to be about equal to what the rest of the Federal Government is spending.

The stuff we are doing in oceanography is directly connected to

military missions.

Now, there is another important point. That at the same time that we are doing half of it is with regard to the total oceanographic effort of the Navy in all appropriations as compared to the total of the Federal Government in all appropriations.

That includes not only the R.D.T. & E. portion of the Navy program, but also the operations and the investment portion of the program. The R. & D. portion has in fact gone down, between 1970 and

1971, by about \$13 million.

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OCEANOGRAPHIC INSTRUMENTATION CENTER OPERATION

Senator McIntyre. Well, again, relating to oceanography, you state that the National Oceanographic Instrumentation Center will be in its second year of operation and that this Center is funded, manned and managed by the Navy with policy guidance provided by a seven member advisory board composed of representatives from DOD, Commerce, Interior, Transportation, NASA, NSF and Smithsonian. Why could not these other agencies provide funds and people to help support this center? What is the amount of funds included in the fiscal year 1971 budget for this purpose and how does this compare with the previous two fiscal years?

Dr. Frosch. The funding for that organization consists of two portions which we might refer to as the Navy portion, which is the part which is what we would clearly want to do for Navy purposes only, and another part that we might call the national increment, which is to support the portion that might be applicable to other

agencies.

In 1970, the Navy portion alone was \$1.24 million and the national increment was half a million dollars. In 1971, the Navy portion is requested at \$1.3 million—I am rounding slightly, Senator, if I may—and the national increment is again to be half a million dollars. The reason for putting the national increment in this budget was essentially a decision of convenience at the Federal Government level to put it all in one departmental budget instead of having a number of separate increments to be asked for.

REQUEST FOR OCEANOGRAPHIC SHIPS

Senator McIntyre. You state that the Navy budget contains a request for two of a new class of small utility AGOR in the 300 gross ton class relating to oceanographic operations. How much is requested for these two ships and where in the budget is that included?

Dr. Frosch. That is included in the ship construction portion of the budget in SCN, and I believe it is \$7.2 million for two ships ships construction. It is not in R.D.T. & E. That is an AGOR, but

not in the class of AGORS we are talking about.

That is a different ship still, and not in the class we are talking

about.

These have always been funded in ships construction and are essentially a facility bought as ships construction and used for oceanographic research.

Senator McIntyre. They do not look like that second one?

Dr. Frosch. No, the second one is a ship which is almost completed, which is a catamaran and will be used by the Naval Research Laboratory when it is finished.

Senator McIntyre. Was that done in R.D.T. & E.?

Dr. Frosch. No, that is ships construction.

Senator McIntyre. Was it ever in R.D.T. & E., that ship?

Dr. Frosch. No.

Senator McIntyre. The know-how was right there to build it from design up?

Dr. Frosch. Yes, it is treated as a design.

MARINE CRAFT AND AMPHIBIOUS LIGHTERS

Senator McIntyre. We have questioned the Army request for \$1.1 million in their fiscal year 1971 budget to develop Marine craft and amphibious lighters because such boats appear to be exactly what the Navy is responsible for providing to the Marine Corps and for Navy use. Do you know about this requirement and do you agree that it should be in the Army program?

I know that may not be a fair question.

Dr. Frosch. I'do not know about the Army requirement. I can speculate that they are talking about a logistic craft that would unload from transport ships, whereas the amphibious craft that we develop with and for the Marine Corps are amphibious assault craft and somewhat different. But I would have to check to find out about that. I think we had better pass on that one, because I just do not

Senator McIntyre. I do not know whether I want to pass or not, because here is an instance where, to the layman, it appears that you may have two different ships. Actually, with a slight modification, both could do the job specified by the Army or by the Navy.

Dr. Frosch. I do know that the Army has been looking at the Advanced Surface Craft program that we have developed for a new generation of amphibious assault landing craft. Now, whether they will decide to use a modification of the craft that we are building for their purpose, I do not know. I think it would be best if I found out a little bit more about the Army program and perhaps jointly with the Army could supply something for the record.

Senator McIntyre. Referring to the question again, I wish you would pursue it, because it appears to us that both boats appear to be exactly what the Navy is responsible for providing to the Marine Corps. We would like to know why you do not know more about it and would you please proceed to find out more about it and let us know why it is that the Army should have—why there is the

distinction.

Dr. Frosch. I will do so, Senator, and supply it for the record. (The information follows:)

I was unaware of the Army effort to develop Marine Craft and Amphibious Lighters since the Army's coordination with the Navy was at a management level lower than my office, namely the Naval Ships System Command. Since the mission of the Army craft was so widely divergent from the mission of the Navy's Amphibious Assault Landing Craft Program's mission, there was no duplicative effort, and both services were in accord with who had responsibility for the different missions it was judged to be unnecessary to inform my office.

The Navy/Marine Corps Mission is to land our forces across a defended beach. In this case the design of the craft must consider the effects of heavy surf and sea conditions, enemy mines, the size of the well decks of the Naval amphibious ships (LSD, LPD, LHA) that will transport them to the Objective Area and the distance offshore they are launched. These factors have led us to the conclusion that an [deleted] vehicle capable of carrying a [deleted] ton payload at [deleted] knots, crossing the surf line and unloading in the beach area will provide the best improvement to our ship to shore movement of troops and

The Army mission is to develop service peculiar marine craft, amphibious lighters and equipment used for transfer of large volume, heavy cargo from ocean transports standing off shore to lighters for ship to shore logistics operations. The design of this type craft must consider the maximum efficiency of off-loading existing and projected merchant type ships at unimproved sites. Thus in order to accommodate the roll on, roll off and container ships the Army craft will be much larger and slower than the assault landing craft.

IMPROVEMENT IN UNOBLIGATED BALANCES

Senator McIntyre. You show a significant reduction in unobligated balances from \$272.1 million at the end of fiscal year 1969 to \$228.5 million estimated at the end of fiscal year 1970 and \$228.8 million at the end of fiscal year 1971. Will you explain why you expect such an

improvement to be made?

Dr. Frosch. Well, if you will look back further in the history of unobligated balances, you will find that previous to 1969, there was a history of a rise in unobligated balances and a good deal of attention by this and other congressional committees to the problem. So we put a considerable degree of management attention to managing the rate of obligation better. We keep very careful track of the rate at which our obligations are going, on a monthly basis, with interim reports whenever there is any data available. We keep track of who is obligating at what rate, and we have run with regard to prior year balances on a "use-it-for-what-you-are-supposed-to-use-it-for-or-lose-it" basis, with the insertion of actual administrative cutoff dates, after which funds revert and can't be used unless special exception is made and that kind of management action has had a very encouraging effect on people being able to get their work done.

I do not know that we will be able to push it very much below the 9 percent. That corresponds to about a month's worth of money, which

is a fairly tight operation.

I would like Mr. Warsing, the Comptroller to speak to that.

Mr. Warsing. Senator, to sum this up and confirm what Dr. Frosch has stated, we projected the gross unobligated carryover balance for both 1970 and 1971, based on the experience in 1969.

It is our opinion that this 9 percent is rather close to a reasonable amount when you take into account our past experiences, which did run as high as 19 percent, unobligated at the end of fiscal year 1966, sir.

SOURCE OF UNOBLIGATED FUNDS

Senater McIntyre. Mr. Secretary, you are requesting that \$15 million of estimated unobligated funds from fiscal year 1970 and prior year R.D.T. & E. programs be reauthorized. Can you identify the programs which comprise these \$15 million? Why should these funds, which will not have been obligated for 2 or more years after being authorized and appropriated, not be used to support your fiscal year 1971 program instead?

Dr. Frosch. The \$15 million was essentially a statistical prediction based on past history of what funds would remain unobligated after 2 years. That is, we simply look back at what the history of prior year obligation was and when asked what our prediction was, this history said that \$15 million was a good estimate. I do not think we know yet exactly what line items that is likely to be in. We could possibly make

some estimate, but I think that we would be closer to guesses.

We have written down a list of line items that we think are likely for carryover, but we are not sure that is the case. As for why they should be carried forward, I think we would look at the line items that had unobligated carryover after 2 years, look at each one individually, and find out after the fact, or at the time the problem arises, whether the original purpose for the authorization and appropriation of the money was still valid 2 years later, and decide whether the money should in fact be used for that original purpose.

If the answer is no, then I think it should be used for some other

purpose.

Senator McIntyre. Like supporting the fiscal 1971?

Dr. Frosch. Well, that would be what it would amount to. The difficulty is that we are not really likely to know which items this is until after the close of the fiscal year.

LIST OF PROGRAM ELEMENTS DEFERRED

Senator McInter. Would you please provide for the record a list of the program elements deferred as of February 28, 1970, showing the total amounts approved and the amounts deferred?

Dr. Frosch. Yes, we will provide that.

(The information follows:)

RESEARCH, DEVELOPMENT, TRAINING, AND ENVIRONMENTAL DEFERRALS

Progra	om element number and title	Approved program	Deferred Feb. 28, 1970	Currently deferred, Mar. 19, 1970
Fiscal year 19	970:			
61102N	Defense research sciences	104, 321	5, 750	
62512N	Ships, subs, and boats	19,000	2,720	2.720
63303N	Advanced arm technology		[Deleted]	Deleted
63312N	A/L S/L antiship missile	5, 920	2, 190	2, 190
63505N	Advanced surface ship sonar development	4, 580	3, 580	3, 580
63607N	[Deleted]	[Deleted]	[Deleted]	[Deleted
64214N	Heavy lift helicopter	1.977	1.977	1,977
64301N	Point defense system development	19, 600	6,800	6, 800
64503N	Sub sonar development	[Deleted]	(Deleted)	(Deleted)
64603N	Unguided conventional A/L weapon	9, 929	2,749	2.749
65801 N	Facilities and installation support.	115, 341	10, 448	10, 448
01004N	International military headquarters agencies	249	249	,
25602N	EA6B aircraft	24, 900	4, 993	
25639N	SHRIKE	1.690	690	690
25645N	WALLEYE	3, 088	2, 088	2, 088
34111N	Special activities	[Deleted]	[Deleted]	[Deleted]
	Total, fiscal year 1970	357, 511	67,960	37, 268
Fiscal year 19	169 :			
64512N	Electronic warfare systems	[Deleted]	(Deleted)	Deleted
64704M	Other Marine Corps systems	7,998	438	438
	Total, fiscal year 1969			
	Grand total	376, 2 69	70, 738	40, 046

DECREASED FUND REQUIREMENTS

Senator McInter. Because fiscal year 1970 appropriations were not enacted until December 29, 1969, you were precluded from proceeding with the commitment and obligation of a substantial part of your program as originally planned. This was aggravated further by the continued deferral of programs by OSD for technical or other reasons. All of these factors would have caused a delay in some part of your program which should permit a decrease in fund requirements in fiscal year 1971 for continuation of these programs. Will you identify for the record the programs which fall into this category and the amounts requested for fiscal year 1971 which may be reduced?

Dr. Frosch. That would be very difficult to do. This is essentially related, to the kind of problem that we had in the previous question. As we stand now, the deferred amounts have been reduced to, I think, something less than they were at this point in the previous year.

On the 17th of February, the total amount deferred was \$94 million, slightly less. Because we were planning the obligation and carrying out of the program, even though we did not have contemplated full appropriation action I believe that the commands and offices might be described as having been braced and ready to carry out the program and obligate the money when the appropriation came through.

Every one was getting a little nervous and preparing to proceed. So I believe we now stand with an obligation position and a deferment position which is somewhat better with regard to obligation and de-

ferment than we were at this time last year.

We could now make some prediction of some items that might not be obligated or committed by the end of the year. But I think it would

only be a rough estimate.

Now, the requirement for the money does not necessarily end with the end of the year, so that it is not necessarily completely transferrable into the 1971 budget, although in some cases, it is certainly the case that late obligation changes the amount of money that it is sensible for a program to have in 1971.

We will try to make an estimate for you of what those items and effects might be, but I think we are still not close enough to the end

of the fiscal year to be sure.

Senator McIntyre. Mr. Fine, would you care to inquire at this point?

Mr. Fine. Yes, sir.

Dr. Frosch, by this time certain programs which were planned to obligate at a much earlier period would be known to you and would not be a function of what happens between now and June 30. I think it would be fairly easy to establish what your planned obligations might have been for the period already passed this year, and if that information is available, you can measure against that what your actual obligational experience is; and to that extent, if there is any significant difference, certainly this could have an influence on the follow-on dollars you will need to finance your 1971 program.

Dr. Frosch. I think we have to do something a little different than that. I think we have to look at the time at which we are likely to obligate a given program and see what that means for the carrying out of program in 1971 and see what portions of the program that simply pushes into the future so they can be, so to speak, lopped off the end

of 1971, rather than using history.

I think something like that can be done. I would like Mr. Warsing

to comment on it.

Mr. Warsing. Yes; Mr. Fine, I would like to give you a comparison here of our experience in obligation through January of this year.

Out of total availability, two gross, of \$2,558 million, we obligated \$1,669 million, or 65 percent through January, whereas in fiscal year 1969, out of \$3,016 million gross availability we obligated \$1.706 million, or 57 percent.

It is our considered opinion that we will indeed meet up to the financial plan in the President's budget. It looks very encouraging at this

time.

Mr. Fine. I would not question your performance in toto. My question is really addressed to specific programs. I think an analysis of individual programs should indicate in some cases that there has been slippage as a result of what has been recited and those cases, I think there can be amounts of money identified which will permit a reduction in follow-on efforts in 1971. I don't think we can debate it, I think it requires an analysis.

Dr. Frosch. We will make the analysis.

(The information follows:)

PROGRAM EXECUTION 1970-EFFECT ON 1971 REQUIREMENTS

The 1971 RDT&EN budget request is based on the full utilization of the funds shown in the 1970 column of the budget. For a program as complex as the RDT&E program, it is not feasible to issue all work requests or negotiate all contracts at the start of a fiscal year; consequently, actions leading to the obligation of funds occur throughout the year. Because of various unpredictable problems, some obligations will be delayed past the end of the fiscal year. For on-going programs, follow-on funding for another increment of effort will be required to pursue the planned program in the budget year even though the work may have been initiated late in an earlier fiscal year. The budget plans reflect this situation and in the FY 1971 budget, we have estimated on the basis of past gross experience that \$228.5 million will be unobligated as of June 30, 1970.

Pursuant to the request of the Committee, an analysis has been made of individual programs in which obligations appear to be lagging. Based on the accounting reports for 31 January 1970, all program elements in which obligations fell short of 60% of the 1970 program were identified. A review of those programs indicates that they are proceeding as planned and, because of factors mentioned earlier, it is not feasible at this time to predict precisely which programs will remain unobligated on June 30, 1970. The actual incidence of unobligated balances will be determined by events between now and 30 June 1970. Further, except where major slippage may occur subsequently in a development project which will delay a portion of the planned effort, the follow-on funding will be required in FY 1971.

Although the appropriation was not enacted until December 1969, program managers had proceeded with the planning so that the delay had no significant impact on program execution. The apportionment review and Project 703 accomplished substantially the adjustments reflected in the final Congressional action. The FY 1971 budget was developed on the basis of an adjusted FY 1970 program.

As previously indicated to the Committee, \$40.0 million of appropriated RDT &EN funds are presently deferred and remain unavailable for obligation. An analysis of the status of and plans for the use of the deferred funds follows:

Analysis of deferrals, R.D.T. & E.N.

Total defe	rred, Feb. 28, 1970	\$70, 73 8, 000
Released by Mar Amounts deferre	. 19, 1970d Mar. 19, 1970	30, 692, 000 40, 046, 000
Status of amount	s deferr ed Mar. 19, 1970 :	
Pending app	roval of reprograming requests:	
	years 1970-75 (DD 1415) 62512N Ships, subs,	
and be	oats	¹ 2, 720, 000
Fiscal y	ears 1970-75 (DD 1415) 65801N Facilities and in-	
stallai	ion support	¹ 10, 448, 000
	don supportears 1970-77 (DD 1415) 64512N Elec. warfare	
systen	18	[Deleted]
Q1		(Delete 41
Sub	total	[Deleted]
Dondingon	novel of News program plan by OCD :	
63303N	roval of Navy program plan by OSD: Advanced ARM technology	[Deleted]
63312N		² 2, 190, 000
63505N		[Deleted]
64503N		[Deleted]
		10 740 000
64603N	Unguided conventional A/L weapons	2, 749, 000
25639N		* 690, 000
25645N		2 , 088, 000
64704N	Other Marine Corps systems (fiscal year 1969 program)	^a 438, 000
Subto	tal	15, 761, 000
Pending sub OSD:	mission of plan by Navy and approval thereof by	
	Heavy lift helicopter	1, 977, 000
64301N	Point defense system development	6, 800, 000
Subto	tal	8, 777, 000
Total	deferred March 19, 1970	40, 046, 000

¹ If approved by Congress, will be obligated immediately.
² Pending congressional approval for reprograming to 64209 F14B/C aircraft. Plan to obligate prior to June 30, 1970.

FEDERAL CONTRACT RESEARCH CENTERS INCREASE

Senator McIntyre. The Navy proposal for the fiscal year 1971 Federal Contract Research Centers, which were specifically reduced by the Congress in fiscal year 1970, amounts to \$58,444,000. This is \$5,404,000 more than the fiscal year 1970 program. Why do you propose this major increase which would indicate that you are not complying with the consistently expressed intent of the Congress to control the size of these organization? Why can't some part of this support be provided by other institutions, contractors, or be performed in-house by the Navy?

Dr. Frosch. I think there are several points to be made.

First, the question as to the meaning of control of the size of the organizations. We have been controlling the size of their manpower; that is, of the amount of manpower and thus the work they can do, so there is effectively a flat continuation of the size of the manpower. The size of the organization does not necessarily mean, however, that the funding requirements annually do not go up and down. That depends, among other things, on the amount of materials and facilities that are needed to do the particular pieces of work.

Now, in principle, the work that is done by these organizations can be done by other organizations. The question is whether the other organizations are going to be more or less competent to do the work. In many areas, these organizations are, we believe, the most competent to do the work, and, in fact, the Navy Federal Contract Research Centers have generally been under continuing pressure which we have had to resist managerially from not only various Navy sources that want work done in them, but, in fact, from other parts of the Department of Defense that would like to get work done in them.

Now, I might ask Dr. Raney, who is Special Assistant for Research, who has been working with this problem specifically, to make some more detailed comments on it.

Senator McIntyre. Doctor?

Dr. Raney. Yes, Senator. The specific increases in the total for the 2 years, going up from \$52 million to \$58 million, are essentially associated with increases at only one of the four Navy FCRC's. That is, the Applied Physics Laboratory at Johns Hopkins University. The others, the Applied Research Lab at the University of Washington, has a very minor increase, the Center for Naval Analyses, minor increase. Ordnance Research Laboratory actually has a decrease. But the increase for the four Navy operations is about \$8 million and most of that is directly attributable to the rising cost of doing business. In keeping with the policy of holding off on the desire to put additional work into these organizations which we feel are, in the work they are doing, the best there is in the country, we have, as Dr. Frosch said, tried to keep the manpower stable. So the money figure increases here are essentially, when you add them up, for the rise in the cost of doing business.

Now, the record between 69 and 70 for the Applied Physics Laboratory, Johns Hopkins, shows essentially level funding. There is a matter of fact, a slight decrease. That is there specifically because of the reductions in the FCRC totals required by Senator Fulbright's amendment of last year. We were forced to reduce their ceiling and they have been trying to maintain a stable work force by deferments and stretch out of program and appropriate delay in purchasing some of the necessary supplies and equipment which they would otherwise have had to buy. You can stretch and delay a program just so long. So we have tried for fiscal 1971 to put them back on what makes a much more sensible funding total schedule, to maintain the stable mannower and the stability in the program that is required to keep a good organization going.

We can, of course, go through the program in greater internal detail and point to certain adjustments within the program. Some of the programs were receiving additional emphasis, some reduced emphasis. But when we figure the gross—that is, the totals for the ceiling—the argument is essentially on what it takes to keep a stable workforce.

Senator McIntyre. The essential increase of almost 10 percent from last year, you say, is accountable or attributable to the inflation cost of salaries for personnel.

Dr. RANEY. Yes, sir, and increase in cost of material.

Senator McIntyre. What would happen if the Congress decided to

cut these 20 percent, these FCRC's, right across the board?

Dr. Raney. Clearly a cut of 20 percent in any given year can't be smoothly handled. Most of that would have to be reflected at those organizations in layoffs and firings. During our best efforts to bring down the manpower in-house in the Navy organizations, we have discovered that it is essentially impossible to handle reductions in the manpower of more than 5 or 6 percent without creating serious turbulence in the workforce. I think a reduction of 20 percent across the board in the FCRC's would require perhaps closing of one or more of the four organizations. But in any case, it would create serious disturbance and would have a very serious impact on the work we had hoped to carry out at those organizations. It simply would not be feasible, in my opinion, to transfer the work and material suddenly from these performing organizations to others.

Dr. Frosch. Generally speaking, that is impossible. There frequently seems to be an idea that research and development performers are interchangable, that if you have some reason to dislike one performer, you can simply transfer the work to somebody else. In the kind of research and development that these organizations are doing, that is not easy, and perhaps not possible. In APL Johns Hopkins, for example, there are groups of people who are unique, both in talent and experience, and we have no place to transfer the work to. We would certainly have plenty of volunteers to take it on, but that is not the same as having competent organizations to take it on.

OPERATION OF CENTERS

Senator McIntyre. The Air Force has a separate program for each of its FCRC's, in addition to providing funds to them from other programs. Why doesn't the Navy follow this practice for all four of the centers which it employs to permit easier identification and control?

Dr. Frosch. Well, we do not run our in-house laboratories that way, either. Of the four FCRC's, three are hardware performing organizations. That is, they do actual hardware development, not paper work, and they do work for many portions of the Navy. We want them to operate in such a way that they are generally responsive on a project basis rather than bloc funding them. We believe we have better control that way, while still allowing us to provide organizational stability through the total size of the project workload.

Senator McIntyre. I had in my mind that all these FCRC's pro-

duce software.

Dr. Frosch. That is not the case in the Navy. Only one of the four FCRC's can be described as a software organization and that is the center for Naval Analyses, which is a studies and analysis organization. The others are all in the hardware research and development business.

Dr. Raney. If I may, Mr. Senator, the origin of all three of the hardware FCRC's in the Navy goes back to World War II, where each one of them grew out of nine National Defense Research Council wartime laboratories. There were quite a few of those and some of them were converted to civil service laboratories, such as Naval Electronics Laboratory Center, San Diego; the Underwater Sound Laboratory at New London. Some of them were put under university cognizance. The three we had in the Navy, which were wartime hardware development laboratories, were all of that category. For 25 years, they have been essentially, in the sort of work they do, indistinguishable from the in-house laboratory complex.

LISTS OF CENTERS

Senator McIntyre. You have listed here the Applied Physics Labcratory Johns Hopkins; Applied Physics Lab, University of Washington; the Center for Naval Analyses; University of Rochester; the Lincoln Laboratory; MIT; the Ordnance Research Laboratory at Penn State. These are five FCRC's that do work for the Navy, is that right?

Dr. Frosch. Yes. Now, the Lincoln Laboratory in the assignment of FCRC's for service cognizance in an Air Force FCRC. Our assignment to it is that we are essentially, buying some research at that laboratory through the Air Force with Navy money, because they can

be of assistance to us on the SANGUINE program.

EXAMPLE OF HARDWARE PRODUCED

Senator McIntyre. Could you give me an example of hardware

that any one of these FCRC's produces for the Navy?

Dr. Frosch. Certainly, the Applied Physics Laboratory at Johns Hopkins was the developer of TRANSIT navigation satellite system. They were the organization that did the first development work on any surface to air guided missile system.

The Applied Physics Laboratory at the University of Washington is the developer of the Underwater Ranging Systems that we now use to study the performance of torpedoes on ranges and that we use for tracking when we do submarine and weapons testing systems.

The Ordnance Research Laboratory has been a developer of tor-

pedoes and torpedo technology.

Senator McIntyre. Does the Lincoln Laboratory produce hardware for the Air Force?

Dr. Frosch. I believe they have built some actual communications satellites and radars and things of that sort, yes.

Dr. RANEY. They developed SAGE system for the Air Force.

Mr. Fine. The statement you made earlier in connection with the distinction between the way the Navy controls and the Air Force, for example, controls Lincoln being in a sense a hardware developer. There is a separate line item for Lincoln laboratories in the Air Force program, which is managed in that manner. So the comparison you drew was not entirely correct.

Dr. Frosch. There are the two choices for operating laboratories. One is to block fund them, which is essentially what you are describing. The other is to project fund them with some independent funding. We have chosen in all of the major Navy laboratories, either in-house or Federal contract research center, to do something which is akin to industrial funding. That is, most of the Navy laboratories are Navy

Industrial Fund operated, the 15 major ones. In this way, we believe we have good control over the laboratories. There are longstanding arguments as to how you go about doing this. We are comfortable with the idea that the laboratory should have to win its workload by its

competence.

Mr. Fine. If you have a basic line item for each of these contractors which represented a nucleus of effort that was of a continuing nature, not subject to significant change as to technical direction, and then you supplemented this by contributions from your other programs, would this in any way interfere with the orderly execution of their programs in any year?

PURSUANCE OF AN ORDERLY AND MEANINGFUL PROGRAM

Dr. Frosch. In a sense, the nucleus part is what might be described

as the independent exploratory development.

That is one of the functions that would play. I think that would run somewhat cross ways to the way in which we do our programing and budgeting, because we have the work of all of these laboratories

attached to particular projects and line items.

Now, it is possible to make a breakout, which is really an estimate of what will happen in the course of the year, for what the funding of a laboratory will be. That is essentially what this breakout is. It is a prediction that says in the course of the year, each of these FCRC's and we can do the same for the in-house laboratories, will get project money plus the in-house case, independent exploratory development money, and so on, to this amount.

Mr. Fine. You did not answer the specific question, however. The question was whether you could pursue a meaningful and orderly

program if you had to?

Dr. Frosch. Well, you certainly can in the laboratory sense. I would have to think quite a lot about how we would pursue the other part of the budgeting, the project part of the budgeting, if we were to budget for the laboratory as a line item and then separately have to connect that line item which is asked for in one place in the budget with the assortment of line items that should be doing the project funding for it.

Mr. Fine. Would you discuss this for the record in some detail,

please

Dr. Frosch. Yes.

(The information follows:)

The Navy's RDT&E budget and its budget presentations are organized on principles of project funding. As has been stated previously, all of the Navy's primary in-house hardware laboratories are essentially project funded, with the funds being requested and justified under the existing line structure of the budget. For all of this in-house work, and for all the industrial contract research and development work also justified in the budget, the intended performer of the work is not specified in the budget request, for often the final decision on who the performer is to be has not been made at the time of budget submission.

In the singular case of the FCRC's, the Navy is required to state in advance who the performer is to be, and at what level he is expected to perform. The Navy controls the activity of the three hardware-producing FCRC's by project funding, although it controls the activity of its sole software-producing FCRC, the Center for Naval Analyses, by what amounts to bloc funding. It is possible to use bloc funding for the CNA because the effect of the CNA is of a special character that can logically be carried in just two lines of the budget. Further there is a formal procedure for agreeing within the Navy, under the guidance of a single officer, and between the Navy and the CNA what their program should be. Thus,

for a software organization serving the Navy it is perfectly possible to use the bloc funding method.

In contrast, the hardware producing Navy FCRC's do work for us that is logically displayed in dozens of the lines in the budget in response to the needs of programs controlled in many parts of the Navy R&D establishment, just as do the Navy's in-house laboratories. The dominant share of the work of all the hardware laboratories is of this character. To change the budgeting system to one where the dominant share of their funding was carried and justified to the Congress as a single line for each of the organizations would not change at all the character of the work they should be doing for us in that the work would still be in support of programs that were principally justified elsewhere in the budget. The net result of such a change would be to distort the apparent cost of the programs being supported by the hardware FCRC's because some of the program costs would be carried in the FCRC line instead of the program line. That would make it more difficult for the Navy to present a clear budget picture to the Congress, and it would make it more difficult for the Navy to ensure that the appropriated funds were in fact spent for the purposes stated in the budget request. The present system has been successful for both hardware laboratories and Navy R&D management. We feel that the requirement to satisfy the sponsor that is inherent in project funding is an important stimulus to quality work in the laboratories, a stimulus that is notably missing from institutional support budget-

It would of course be possible to add several new lines in the budget to show the minor fraction of the budget at each FCRC that represents independently generated work. Such an addition would not increase our control over their operation, for adequate administrative procedures for that portion of the work already exist.

HARDWARE PRODUCED

Senator McIntyre. Just so I will have a little bit of understanding, I take it that these think tanks, as they are referred to, do produce hardware but the hardware is of a model type.

hardware, but the hardware is of a model type.

Dr. Frosch. I would only describe one of the FCRC's we have been talking about now as being a think tank. That is the Center for Naval Analyses. The others are Federal contract research centers, but they are laboratories. I would not describe them in any sense as being think tanks. I think a think tank is used to refer to the software place.

Senator McIntyre. All I am trying to do is—I had an idea that all

they produce is software. Now you have told me this is not true.

Dr. Frosch. Some of them produce hardware.

Senator McIntyre. Now I am trying to limit my question to the hardware. They produce a working model, for instance, of the satellite you spoke of, or they would, in their laboratory, build up a proto-

type.

Dr. Frosch. Almost all of what they do is developmental objects and prototypes. Now, there have been some cases that have gone to production in a particular sense. TRANSIT was an example. The first satellites that were put up, while it was still designated an experimental system, but at a time when the fleet was in fact using them operationally, were actually built by APL Johns Hopkins. There was then, incidentally, an attempt to go into production outside of Johns Hopkins that got into trouble and APL had to go on producing satellites for a while to keep the system operational.

Senator McInytre. Thank you.

LARGEST SINGLE INCREASE REQUESTED

The major FCRC increase involves the Applied Physics Laboratory, Johns Hopkins University which increases from \$21.9 million in fiscal year 1970 to \$27.6 million in fiscal year 1971. The major programs which comprise this increase are Fleet Ballistic Missile \$2.6 million.

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Advanced Surface-to-Air Missile System \$0.7 million. Air launched-surface Launched Anti-Ship Missile \$0.7 million, and Astronautics \$0.7 million. Will you explain briefly now and at length for the record why such increased support by the Center is needed? Why is FBM the largest increase if the total FBM development program declines from \$196.7 million in fiscal year 1970 to \$122.7 million in fiscal year 1971?

Dr. Frosch. May I ask Admiral Severing Smith, who is director of the Strategic Systems Project Office, to explain the first item, the FBM increase?

Senator McIntyre. Certainly.

Admiral SMITH. That increase was for the SSBM defense project, which is a small part of the total FBM program. The Applied Physics Laboratory was selected for that because of the particular competence that they had and because of the particular experience that they had developed and knowledge of the SSBN operations in the course of assisting with the main FBM system and assisting with the POSEI-

DON, particularly in the operational tests, work of that sort.

The Applied Physics Laboratory was selected as the principal activity carrying out the SSBN Defense project because of the particular competence and experience with the FBM program of two of the Laboratory groups. The first is the group which has, since the beginning of the POLARIS program, provided engineering analytical assistance to my office for the conduct and evaluation of the Demonstration and Shakedown Operations tests conducted by each SSBN at Cape Kennedy, of the operational test firings and annual follow-on operational test firings conducted for each missile type by deployed SSBNs, and of the patrol performance digital data, tape recorded by each patroling SSBN. The second group is the Research group which has been called on many times by the first group for the indepth research in order to gain understanding of problems disclosed by the engineering analysis. The Transit Navigation Satellite was invented by members of this Research Group while working on an independent research project as a direct result of their having worked on POLARIS navigation problems developed by the analytical group.

Dr. Frosch. On the advanced surface-to-air-missile system, this is the AEGIS that we were beginning to develop. We expect APL to play a very heavy role as the Navy's technical adviser and assistant in guiding the program. For example, they have already built up a simulator arrangement in which they can demonstrate the kinds of command and control functions and radar functions that we are interested

in the prime contractor doing.

So they are a technical assistant to the project officer in helping to

keep the program healthy.

In the astronautics area, they have been asked particularly to work on [deleted] the TRANSIT satellite navigation system against the possibility of [deleted] on this navigation system which is used by the Fleet Ballistic Missile System. They are the best qualified to do that kind of work because they are the designers and developers of the TRANSIT system. That is a new requirement.

Another area where APL will contribute is on the add-on surface launched anti-ship missile—this is what I have referred to before as HARPOON—it is a new weapon system program, and we expect them to play a role in it which may be similar to what I described for the

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Advanced Surface to Air Missila System. We are using them because their special capabilities in [deleted] and advanced missile.

Senator McIntyre. Astronautics, \$700,000.

Dr. Frosch. I mentioned that. That is for the hardening of the

TRANSIT navigation satellite.

Senator McIntyre. Adm. Levering Smith, in his answer, replied to my question as to why the FBM reflects the largest increase as the total FBM declines—it simply has no relation. Is that not right?

Dr. Frosch. Well, this is essentially a new—the defense problem is a new problem which, in the past year or so, has been introduced as part of the overall R.D.T. & E. of the FBM system. This particular group, having had extensive experience in this earlier development of the FBM system, seems to be the most appropriate one to take on those portions of the program.

Senator McIntyre. Off the record.

(Discussion off the record.)

AEGIS RELATION TO SAM-D

Senator McIntyre. Let me ask that question again for the record. Mr. Secretary, is the Advanced Surface-To-Air-Missile System, known as AEGIS, in any way related or in any respect the same as

the program in the Army known as SAM-D?

Dr. Frosch. There was a period in the history of those two programs where a major effort was made to see whether they could be completely common and, in fact, the same system. I worked together with the Assistant Secretary of the Army and many staff people for a long period of time to see if we could so define it. We finally concluded that it would not be sensible to do so, and so they have gone on to development of separate systems. We are continuing in liaison and coordination so that we can look at the possibility of some things like displays being common between the two systems.

IMPACT ON PROGRAM OF BUDGET CUTBACK

Senator McIntyre. Mr. Secretary, will you provide for the record what the specific impact would be on each program element involved in the increases that you propose for the FCRC's if such increases were not approved, and will you consider in your response that such support may be sought from sources other than FCRC's? For example, in-house, industry, or some other?

Dr. Frosch. We shall provide it for the record, sir.

(The information follows:)

If the proposed particular increases in allocation of work to the FCRC's were not approved, there would be no immediate reduction in any budget element, since the money would still be required to attempt to have the work carried out elsewhere. Similarly, the proposed decreases in allocation of work have been made for program purposes. Since we believe that assigning work to our FCRC's is assigning it to the optimum performer in each case, the ultimate impact on the budget would be to increase the requirement in the affected budget elements, since the Navy would have to work with performers with considerably less relevent experience and capability.

In contract to the lack of impact on the budget requirements, lack of approval of the requested increases will have a major impact on progress in the affected programs, and will discard patiently nurtured experience and competence through disappearance of the working teams at the FCRC's. The major increases under question are all at the Applied Physics Laboratory, Johns Hopkins University.

a. The net increase work related to the overall FBM program represents a

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very high priority effort to assess quantitatively the technological and physical factors that bear on the continued survivability of the SSBN well into the future. The laboratory is to develop and assemble all the relevent technologies, and examine appropriate operational tactics, that will both ensure the survivability of the present force and underlie that of future sea-based systems. In addition to its unquestioned technical excellence in all of the relevent technical fields, the laboratory has an unparalleled familiarity with the SSBN's, their crews, their operations, and their design constraints growing out of ten years of extensive experience in continuous test and evaluation of the Polaris system. There is no other group in the country similarly qualified to do this work, and any attempt to groom another organization for the task would be a serious setback in this area. A minor portion of the increase is devoted to work that will improve the [deleted] Transit navigation system in a [deleted] environment. Since the Transit system was conceived and developed at APL/JHU and the laboratory has supervised the training of a qualified industrial producer of the Transit satellite, APL/JHU is the only sensible organization to develop improvements in the system.

b. The Advanced Surface-to-Air Missile System line refers to the AEGIS Program. This is one of the major new weapon system developments in the Navy's FY 1971 RDT&E budget. During FY 1970, the program completed competitive Contract Definition, and a prime contract was awarded to RCA for Engineering Development of the system. In the field of Fleet air defense, the Navy has relief on hte APL/JHU as its principal technical performer for the past twenty-five years. During the initial stages of the AEGIS Program, APL helped define the baseline system as a point of reference for the contractors' design proposals and source selection. APL subsequently demonstrated the feasibility of the baseline system by designing and testing its critical radar elements, During the current full scale Engineering Development stage, APL will continue to serve as the Navy's principal technical agent, for there is no other organization with APL's unique expertise in Fleet air defense. The increase in effort at APL is necessary as the system moves into full development.

c. The Air Launched-Surface Launched Anti-Ship Missile line concerns the HARPOON missile, which is in the technical exploration phase of Concept Formulation. APL/JHU will assist in this program in several ways; but the unique contribution will be in the area of ensuring that the ship system is such that the missile can be properly launched from surface ships. The increased effort at APL is required as a normal portion of the increased momentum of the Harpoon Program. As the Navy's most experienced organization in working with the particular problems of fire-control, launching, and guidance of missiles launched from surface ships, APL/JHU is in a unique position to assist the Navy in this

program, too.

d. The Astronautics group is responsible for a long series of distinguished accomplishments in the use of space systems for navigation purpoes. The planned program includes a number of exploratory projects involving the addition of azimuth determination and range measurement to present capability, as well as certain minor hardware items to improve the operating economy of the Transit system. The ideas to be pursued here grow directly out of previous work of

the group, and thus cannot be carried out elsewhere.

e. There are continuing modest increases to support APL's role as systems integration agent for the Ships Anti-Missile Integrated Defense (SAMID) Program. This program is a high priority Navy effort to improve ship's defensive capability against the cruise missile threat. Installations of defensive equipment are being regularly extended to additional classes of ships, with a consequent increase in the scope of the APL effort, particularly in the command and control, and electronic warfare areas. The Laboratory has already contributed significantly to the technical program by developing such key items as an [deleted] for training purposes, and a data transfer system for reducing ship's reaction time to an approaching threat. A major part of their responsibility in FY 1971 will be certain at-sea testing of the SAMID configuration. In this program, as in the others, no other organization with comparable background exists.

Senator McIntyre. Your detail for the FCRC's applicable to the R.D.T. & E. appropriation is not uniformly identified by program element. Will you provide such detail for all 3 years that comprise the amounts shown for other Navy appropriations?

Dr. Frosch. Yes. We can certainly do that for 1969 and almost completely for 1970. It may be incomplete for 1971, because all of the details of line item may not be completely defined at this point?

Senator McIntyre. That will be fine. (The information follows:)

FEDERAL CONTRACT RESEARCH CENTERS FUNDING BY PROGRAM ELEMENT

[in thousands of dollars]

			Budget activity	Actual, fiscal year 1969	Estimate, fiscal year 1970	Estimate, fiscal year 1971
Applied[Physics A.[R.D.T. &	Laborator	y, Johns Hopkins University:				
	• heteler B					
• • • •	11221N	FBM system	3	1,010	[deleted	
	11224N 11225N	SSBN defense	3	1,369	lagiorea	
	11223N	SSBN defense	4			1,900
	11314N	FBM command and control	3 -	74	338	1, 250
	63401N	FBM command and control Navigation satellite	4	1,704	1,933	650
				4 152		5 450
	25616N	Subtotal, FBM		4, 157 1, 821	4, 000	6, 450
	25638N	Aircraft systems improvement Surface missile systems project	2 3 5 4	5, 435	2, 399	2.02
	31015N	Special collection activities	5	89	[deleted]	[deleted
	31023N	Geodesy/ANNA Defense research sciences	4	74	74	7
	61102N 62211N	Defense research sciences	1 2 3 3	649 15	719 [deleted]	529 [deleted
	72311N	Aircraft exploratory development Missile propulsion	3	798	1,549	1,67
	62312N	Strike warfare weaponry	š	917	[deleted]	Ideleted
	62411N	Astronautics exploratory develop-			•	•
		ment	4	585	70	90
	63302N	Augmented thrust propulsion	3	1,260 150	(Deleded)	Malakadi.
	63309N 63312N	Advance point defense surface missile	3	1,037	[Deleted] 1,403	[Deleted] 1,90
	63509N	A/L S/L anti-ship missile	5	1, 037	1,400	1,50
	63607N	[Deleted]	Ğ	391	[Deleted]	[Deleted]
	64301N	New ship design [Deleted] Point defense system development	3	235	228	
	64302N	3T major systems development	3	255	2, 753 2, 395	2, 85 3, 10
	64303N	Advance surface missile system	33356333555	1,685 1,069	[Deleted]	[Deleted]
	64512N 64514N	Electronic warfare systems Navigation systems	š	1,003	[neieren]	•
	64521N	SAMID	Š	795	941	1,74
	65104N	Studies and analyses, Navy	ĩ	891	685	35
	65302N	Missile/weapons systems test	3	139	225	45
	65804N	SAMID Studies and analyses, Navy Missile/weapons systems test Technical information centers vy industrial fund	8	400 456	322	29
	871	btotal, R.D.T. & EN		23, 414	21, 975	27,62
	54	=				
B. PAMN:	11221N	FDM aveters		(Deleted)		
	11221N 24411N	Fleet except (major)		169	1, 253	550
	24412N	FBM system Fleet escort (major) Destroyers		488	200	š
			-			
o 00N.	Su	btotal, PAMN		657	[Deleted]	
C. SCN:	24411N	Fleet escort (major)		570	588	52
	244111	Tiest escott (major/				
D. OPN:						
	11221N	FBM system		62	[Deleted]	
	31015N 31023N	Menning charting and goodesy		. 26 98	[Deleted] 926	
	78012N	I naietic support activities		150	100	30
	24141N	Attack carriers		17	17	1
	24411N	Fleet escort (major)		769	629	13
	24412N	Destroyers		1,016	34	
	24413N 24497N	Technical sensor collection Technical sensor collection Mapping, charting and geodesy Logistic support activities Attack carriers Fleet escort (major) Destroyers Anti-submarine warfare escorts Training		34 43	•	
	Sub	total, OPN		2, 215	1,706	79
	A		:			
E Q. & M	N: 11221N	FBM system Logistic support activities F-4 squadrons Aviation support (TACAIR) A-6 squadrons Mapping, charting, and geodesy Scientific and technical intelligence Technical sensor collection		4 515	[Deleted].	(Deleted).
	78012N	Logistic support activities	·	1 889	1,925	2,00
	24116N	F-4 squadrons				
	24129N	Aviation support (TACAIR)				. 4
	24114N	A-6 squadrons			. 900	1, 2
	31023N	Mapping, charting, and geodesy		842	812 (Deleted).	The leaded?
	31022N	Scientific and technical intelligence		269	Deleted).	[Deleted]. [Deleted].
	31015N 35112N	Oceanography		10	freierent.	(Deleted).
		total, Q. & MN			8, 052	9,72
		il, APL, JHU			34, 367	39, 95
	1012	II, NI L, JIIV.	/		<i>57,501</i>	33, 33
		D	iaitized by	ا2009	e	

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FEDERAL CONTRACT RESEARCH CENTERS FUNDING BY PROGRAM ELEMENT—Continued [In thousands of dollars]

			Budget activity	Actual, fiscal year 1969	Estimate, fiscal year 1970	Esti mate fiscal year 1971
2. Applied Physics Labo A. R.D.T. & EN:	orato	ry, University of Washington:				
25601N 25626N	MA Son	RK-48 torpedoar fleet support	. 5	374 459	100	
25627N 61102N 62512N	Def Shi	lerwater ordnance fleet support ense research sciences ps, submarines, boats	. 1 5	225 170	185 50	200 50
62611N 63311N 63603N	Sut	dersea warfare weaponry marine tactical weapon system launched anti-ship torpedo	. 3.	695 600	857	839
63703N 64515N	Mo	blie ASW target surveillance equipment program	. 7	65	[Deleted.]	[Deleted.
	S	ubtotal, R.D.T. & EN		2, 588	1, 317	1, 189
B. SCN: 24311N 24412N		omarinestroyers		254 198	90 144	150
	S	ubtotal, SCN		452	234	150
	22N 12N	S. & T. intelligence		125 340	[Deleted]	[Deleted] 610
		Subtotal, O. & MN		465	[Deleted]	[Deleted]
		Total, APL, University of Washing-		3, 505	2, 054	2, 349
3. Center for Naval Ana	lyse	s, University of Rochester:				, 1411 - 1, 144
	11 N 01 M	Cryptologic activities. Center for Naval analyses (Marine		22	[Deleted]	[Deleted]
651	02N	Corps)		894 8, 200	947 7, 443	900 8, 000
		Subtotal, CNA		9, 116	[Deleted]	[Deleted]
B. O. & MN: 81113N	Pro	fessional training		22	22	22
	1	otal, CNA		9, 138	8, 500	9, 097
A. R.D.T. & EN	:	ssachusetts Institute of Technology:	•			
11314N		M command and control		750 750	475 475	750 750
5. Ordnance Research		ratory, Pennysivania State University:		/30		
A. R.D.T. & EN 25601N 61102N	: MH	-48 Torpedoense research sciences	. 6	3, 380 949	2, 320 886	1, 500 1, 055
62512N 62611N	Shi	ps, submarines, boatsdrsea warfare weaponry	- 5 - 6	210 3, 085	180 2, 568	200 2, 943
63311N 63601N 63602N	Ad	bmarine tactical weapon system vanced mine development W torpedo countermeasures resitance	. 6	25 573	[Deleted]. [Deleted]. [Deleted].	[Deleted]. [Deleted]. [Deleted].
D 0 8 MN		Subtotal, R.D.T. & EN		8, 222	6, 594	6, 248
B. O. & MN: 31022N	Sci	entific and technical intelligence		60	[Deleted]	[Deleted]
		Total, ORL		8, 282	[Deleted]	[Deleted]
6. Hudson Laboratory, A. R.D.T. & EN 62712N	Colu :	mbia University;				
62712N 63701N	En ¹	vironmental supportvanced undersea surveillance		2,000 1,080	[Deleted] [Deleted]	[Deleted] [Deleted]
	1	Total, Hudson Laboratory		3, 080	[Deleted]	[Deleted]
	(Grand total, Federal contract research centers		59, 165	52, 040	58, 444

Note: The Federal Contract Research Center's details in the fiscal year 1971 budget justification book were prepared in December 1969 based on broad program classifications. The detailed analysis by program element set forth herein reflects a more current distribution of funds as of March 1970.

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COST FOR NAVAL ANALYSES INCREASE

Senator McIntyre. The Center for Naval Analyses Navy program discussed in your statement "will continue at the funding level at which it has operated for the past five years." However, the amount requested for fiscal 1971 is \$8 million compared with \$7.6 million in fiscal year 1970. Since these facts appear to be contradictory, will you explain?

Dr. Frosch. The fiscal 1969 actual for the total amount of the Center for Naval Analyses was slightly over \$9.1 million. The fiscal 1970 budget, which is still an estimate since the year is not yet complete, was \$8.5 million, while the 1971 estimate is \$8.9 million. There has been a small increase in some work that CNA does related to crypotologic activities, but the basic program went down some in 1970 and up in 1971. The basic size of the organization has remained the same.

Dr. Raney. I might add, sir, that since the funding has been essentially constant, the number of employees has decreased. It is about 5

percent less now than it was a year ago.

Senator McIntyre. Well, the question indicated that you say it is going to be funded at the same level, yet you are adding \$400,000 more, based on the facts given in the question. I have not gotten an answer yet. What is it—inflation, personnel, salary increases?

Dr. Frosch. It is basically inflation and salary increases. The personnel level has remained flat or lower. It is something I shall have to

look up.

Senator McIntyre. I suppose I shall have to be satisfied with inflation.

Dr. Frosch. In fiscal 1970, they had a total of 433 people. The expectation for fiscal 1971 is 410. In fiscal 1969, they had 458. That is a drop of almost 50 people in the 2 years.

QUALIFICATIONS FOR STUDY

Senator McIntyre. The recent work of this Center include (1) an aircraft pipeline study in 1969 which recommended a change in the aircraft repair facilities budget to match the number and rotation of aircraft, and (2) an examination of the value Sea-Based Expenditionary Force for the 1980's.

Will you explain why this Center is uniquely qualified to perform

these two studies?

Dr. Frosch. This Center was organized, I think is the word, as an FCRC so that it could have the following properties as an FCRC, it would have no industrial or hardward axe to grind so that we could feel free to work very closely with it. On the other hand, since it is not directly in the Navy line chain of command, it could preserve a degree of independence from direct Navy direction and control so that we could walk the narrow line between having a commercial interest in how the answer comes out, and having possibly too much internal Navy control of how the answer comes out. Thus they are uniquely qualified to work very closely with Navy people who want that kind of analytical work done.

Now, the other thing is that having been in existence for quite a period of time, the staff has built up a unique background of capability, and in fact, a unique library, as well as what is in their heads, for deal-

ing with this kind of problem on the basis of a long history of past data of how the Navy operates, and an intimate knowledge of what the Navy's interests and ideas are in a strategic and operating sense.

I might add that as part of keeping the intimacy of this relationship, the Office of the Chief of Naval Operations assigns a group of naval officers who work as a portion of CNA so that naval officers are involved along with the civilian analysts in the direct examination of such a program.

PRESENT VALUE OF STUDY FOR FAR FUTURE USE

Senator McInter. Well, now, the second study; this was a study to examine the value of a sea-based expeditionary force for the eighties. What is the value at this time of a study on sea-based expeditionary forces for the 1980's?

Dr. Frosch. Because if the concept makes sense on the basis of examination, and if we are to develop the technology and the capability to have that concept in the 1980's, we have got to get started

on it now.

The question here is does it make sense, would it make sense to try to build up a naval capability so that a very much larger fraction of the kind of warfare effort that we put in Vietnam could be based offshore at sea rather than based ashore in the country? There are some obvious advantages that would accrue from that, including the political advantages of not having the troops asore, the economic advantages of a lessened degree of reliance on logistics out loading ashore, the effects on the economy of having troops in the cities, and a number of similar advantages. The difficulty might be that it is technologically impossible or economically foolish. The idea was proposed. We would like to find out whether we can prove that it is economically sensible or not, whether it makes military sense, whether we think the technology is possible. To do this on a large scale would take quite a while to generate readable results.

Senator McIntyre. What are the results?

Dr. Frosch. Well, I think the results were that the idea originated in the Navy; it was pushed to a very great extreme as an idea—namely, could everything be done from offshore? The results of the analysis that CNA did indicated that it was not a sensible idea when pushed to the extreme at which it had been proposed, but there were some intermediate levels of offshore basing that might, under some strategic and tactical circumstances, be sensible.

Senator McIntyre. Will you send to me a copy of that report? Dr. Frosch. Yes. The report is being reviewed and is scheduled for printing and distribution in June 1970. I will furnish you a copy of

the report.

REDUCTION IN NAVAL ACTIVITIES

Senator McIntyre. The Secretary of Defense just announced a major base closure plan which will have a significant effect on the DOD fiscal year 1971 program. Are any of the reductions to be made in Navy activities which are financed from this appropriation? If so, identify the specific locations, program elements affected, num-

bers of civilian and military positions and man-year equivalents to be reduced and the estimate of funds to be reduced in fiscal year 1971 from your budget?

Will you do that for the record?

Dr. Frosch. We shall do that for the record.

(The information follows:)

BASE CLOSURES

The base closure plan announced in March 1970 did not reduce RDT&EN activities below the levels included in the FY 1971 budget request.

PROGRAM IN SUPPORT OF VIETNAMIZATION PROGRAM

Senator McIntyre. Will you identify by program element and amount any items which are in your fiscal year 1970 program and fiscal year 1971 budget directly in support of the Vietnamization program? You can do that for the record, too.

Dr. Frosch. Yes.

(The information follows:)

The following projects (Vietnamese Laboratory Assistance Program—VLAP) are in direct support of the RDT&EN Vietnamization Program in FY-1970 and FY-1971:

Program element	Projects	Fiscal year 1970	Fiscal year 1971
62312N	VLAP-1		
Total	VLAP-1VLAP-2	[Deleted]	

Senator McIntyre. Are there any programs, Mr. Secretary, in fiscal year 1970 which were either specifically deleted or reduced by the Congress or which were identified as being of special interest, that you are pursuing without having obtained prior congressional approval?

Dr. Frosch. None.

Senator McIntyre. The Air Force states that their experience in Vietnam in truck interdiction is a [deleted] percent killed-versus-struck ratio. What is Navy experience and is any developmental

work being proposed in this area?

Dr. Frosch. I shall have to go back and find what the operational experience is. I do not have that. There is developmental work being done to try to improve the sensor and strike systems. The Marines have been interested in some changes to the OV/10 aircraft, and we have continued work on the [deleted] TRIM aircraft, both of which use [deleted] attack systems that could be used for that kind of interdiction.

Senator McIntyre. Will you check your records?

Dr. Frosch. I can give both the statistics and expand on that.

Senator McIntyre. Do not forget the last part, has the Navy any experimental work underway in this area?

Dr. Frosch. Yes, sir.

(The information follows:)

Although no overall Navy statistics have been kept on this specific item, statistics are available for certain periods which are representative of Navy

truck killing experience. For instance, during the period [deleted].

Development work proposed in this area includes: [deleted] TRIM aircraft with improved detection sensors, scheduled for [deleted], OV-10 aircraft [deleted] and the A-7E with its improved [deleted] system. These systems will provide both a day and night capability.

PROGRAMS INVOLVING [DELETED] DEVELOPMENT

Senator McInter. The Navy has a number of programs involving [deleted] development and application. Will you provide a list of programs and projects in fiscal years 1969, 1970, and 1971 relating to this technology, including a discussion of their interrelationship and coordination with other services?

Dr. Frosch. Yes.

(The information follows:)

1. Navy programs and projects relating in a substantive degree to [deleted] development and application for FY 1969, 1970 and 1971 are listed below. The listing is by R&D Category. [Deleted.] The basic [deleted] technology in support of these applications is pursued in Exploratory Development Category as a continuation of the fundamental work carried out in the Research Category. Research topics under investigation include: basic studies; [deleted] modulation

mode control and stability; [deleted] and safety.

2. It should be noted that in many of the projects which have been identified as relating to [deleted] technology, the [deleted] is but another competitor with other devices of an [deleted] for use in an eventual end-product sub-system or system. This is particularly true of the projects which are supported in Exploratory Development, the category where the majority of the [deleted] associated work is performed. Consequently, it should be understood that while the projects listed below relate to [deleted] technology they do not always represent effort which is solely devoted to [deleted]. Nor, and this is particularly true of the work in Exploratory Development, is the Navy committed to the choice of [deleted] in preference to some other [deleted] in the final version of the system or component under development. The [deleted] is an extremely versatile device, and as such, has potential for applications in a broad spectrum of uses.

3. Within the Navy, the broad subject of [deleted] technology is coordinated and encouraged through the Joint CNR-CND Staff Working Group for [deleted] Research and Exploratory Development. This group with broad Navy technical representation, works closely with the Navy membership of the DOD Special Group on [deleted] in assuring a coordinated [deleted] technology program visa-vis the other services and ARPA. The group sponsors a yearly Navy Wide [deleted] Conference to bring together all elements of the Navy R&D community concerned with [deleted] to discuss progress and future plans. The group coordinates Navy participation in Bi-yearly DOD conferences held for the same purposes but on a DOD wide basis. The group also participates in an advisory capacity in the management of line item application developments in Advanced Development to insure optimum utilization of available [deleted] technology for such developments and to expose technological deficiencies that may require additional fundamental effort. Specific programs for [deleted] development such as the Navy's [deleted] Program being pursued under Project [deleted] are coordinated with similar programs of the other Services by the Office of the Director Defense Research and Engineering and by interservice coordinating groups established for the purpose.

NAVY PROJECTS RELATING TO [DELETED] DEVELOPMENT AND APPLICATION TECHNOLOGY

FISCAL YEAR 1969

Exploratory development. [Deleted.] Project number [Deleted]	Title [Deleted]
Advanced development. [Deleted.] Project number [Deleted] Engineering development. [Deleted.] Project number [Deleted] FISOAL YEAR 1970	Title [Deleted] Title [Deleted]
Exploratory development. [Deleted.] Project number	Title [Deleted] Title [Deleted]
Exploratory development. [Deleted.] Project number [Deleted] Advanced development. [Deleted.] Project number [Deleted] Engineering development. [Deleted.] Project number [Deleted]	Title [Deleted] Title [Deleted] Title [Deleted]

IMPLEMENTATION OF SECTION 403

Senator McIntyre. Section 403 of the fiscal year 1970 Military Procurement Authorization Act pertains to I.R. & D. Although our Ad Hoc Subcommittee on Research and Development has held separate hearings including Dr. Foster, each service should have an opportunity to comment. Will you answer the following questions:

a. What implementing actions have been taken by the Navy? I

guess for the record would be better.

Dr. Frosch. Yes.

(The information follows:)

As the result of the issuance of Defense Procurement Circular Number 75, the Navy issued NAVMAT NOTICE 4255 dated 9 February 1970. This Notice requires each command to compile the following data:

a. The amount of funds obligated from 1 July 1969 to 10 December 1969, date of DPC #75 (these funds are exempted from the provisions of the Act.)

of DPC #75 (these funds are exempted from the provisions of the Act.)
b. The amount of funds obligated subsequent to 10 December 1969 which are not subject to the Act because they are obligated under other funds or fall within the exceptions indicated in Section 403 of the Act.

c. The balance of funds obligated subsequent to 10 December 1969 which are

subject to the Act.

d. The negotiation record shall indicate the amount contemplated for IR&D, B&P and OTE and the amount of the related 7% reduction where approprate.

Senator McIntyre. Have you had an opportunity to review the GAO report; and, if so, would you care to comment on it?

(The information follows:)

Yes, the GAO report has been reviewed. We agree with matters of fact appearing in the report.

Senator McIntyre. Do you believe a separate line item or a ceiling is the answer to meaningful control? If not, how would you control the level of costs?

(The information follows:)

It is believed that a separate line item would not be workable since IR&D would no longer be independent but rather would require justification for each individual item as is the case for R&D. Additionally, the method of allocating such dollars by contractor would be extremely difficult. It is considered that the use of mandatory advance agreements with cost sharing and increased emphasis on the technical evaluation is a better technique for the control of the level of costs.

Senator McIntyre. Would the alternative of mandatory advance agreements coupled with dollar ceilings, cost sharing, and annual technical reviews be effective in controlling costs and insuring relevancy to military programs?

(The information follows:)

As indicated in the answer to the previous question, these are considered appropriate techniques and are considered a more sound alternative than a separate line item for ceiling.

Senator McIntyre. Do you have any suggestions? (The information follows:)

The plan selected and approved by the Deputy Secretary of Defense on 2 March 1970 provides the Navy with adequate guidance on the policy for handling of IR&D, B&P and other technical effort.

Senator McIntyre. Will you provide an estimate of the amount of funds the Navy will pay in fiscal year 1969, fiscal year 1970 and fiscal year 1971 for I.R. & D., B. & P. and OTE?

Dr. Frosch. Yes, sir.

(The information follows:)

It is believed that the Navy's costs for the fiscal years cited will remain at an annual level of approximately \$230,000,000.

PROJECT MALLARD

Senator McIntyre. Does the Navy have any requirements in the fiscal year 1971 budget for Project MALLARD, the international tactical communications system?

Dr. Frosch. The connection with MALLARD is principally to the interests of the Marines, and I would ask General Metzger to respond,

II I may.

General Metzger. Yes, Senator. We have been monitoring the MAL-LARD program with two liaison officers. Our only financial participation has been to carry out a study effort which meshes with the MAL-LARD effort to define our own communication requirements. There is no money in 1971. In 1969 and prior, we had \$87,000, and in fiscal year 1970, we have \$670,000.

To give you a complete answer, sir, we have also carried out a study which was funded by MALLARD on the Joint Amphibious operations to determine communication requirements. To that end, we have requested \$313,000, of which MALLARD has provided us \$251,000 so far It is solely a study effort sir

far. It is solely a study effort, sir.

Dr. Frosch. There are also Navy liaison officers with the MAL-LARD project. Our intention is to follow closely what the Army is doing and be in a position to purchase those pieces of equipment that are

developed under MALLARD that Navy and Marine Corps can and should use, and to be sure that our communications have suitable interfaces with the developments that come out of MALLARD.

PROGRAMS IN SUPPORT OF SOUTHEAST ASIA OPERATIONS

Senator McIntyre. Will you identify for the record by program element and project the amounts you have in fiscal year 1969, fiscal year 1970, and fiscal year 1971 for support of Southeast Asia Operations?

Dr. Frosch. Yes.

This is R.D.T. & E. support? Senator McIntyre. Yes.

Dr. Frosch. Yes.

Senator McIntyre. Any time I ask a question that is not on R.D.T. & E., you call my attention to it.

Dr. Frosch. I am just trying to be sure, because it could be either

easy or vast.

Senator McIntyre. All right. (The information follows:)

R.D.T. & E. N-SOUTHEAST ASIA NOA, FISCAL YEARS 1969-71

Fiscal year 1971 submi	Fiscal year 1970, current program	Fiscal year 1969	Title and name	Element project number	Budget activity
			V/STOL developments	63203N	2
		852	V/STOL developments HELO escape system A/S fire control system A/S TGT acquisition Airborne bom. ing equipment	W4559	
			A/S fire control system		2
1, 500	2,000	2, 588	A/S TGT acquisition	W1118	
500	1, 875	1, 951	Airborne bom ing equipmentABN EW equipmentABN jamming and deception	W1119	_
	 		ABN EW equipment	. 63206N	2
)	5, 511	ABN jamming and deception	W3311	
		3, 835	ABN IR CM	W3312	
	ļ	964	EELS improvement	W3340	
		1, 0 9 3	ABN RDO D/F	W3610	_
	i		Environmental application		2
	Deletedi	1, 452	Atmospheric application	W3712	_
	,,		Advanced airborne reconnaissance		2
	ł	2, 900	Reconnaissance drone (SPRA)	W3665	_
		4, 564	[Deleted] target designator	_ 64205N	2
		4, 304	Bulldog Trim/comb sens veh	W1176	_
	i	6, 800	i rim/comb sens ven	_ 64206N	2
	,	0, 800	SAR system device	W1163	_
			SAK System device		2
	Malalad 1	2 600	Combat SAR A/CSearch and rescue system	W4518	
	(naiered:1	2, 600	Search and rescue system	W4554	•
•••••	`````	056	AIMS/ATCRBS/MK 12		2
	[Deleted.]	1 420	IFF Mark XII Shipborne IFF/Mark XII	W1714	
			Snipporne irr/mark XII	S1714	2
10.00	1,977		Crane helo/heavy liftdo	- 62414N W1420	Z
14,00	1, 3//	230	Favianamental med avetem	W142U	2
	Maletad 1	1 600	Environmental mod system	- 0421814	4
	[Deleted.]	/25 900\	Airborne pyrotechnic devices AEW CV-BSD A/C E2A	W3717	2 .
	·	15 800	do	W1602	Z
•••••		13, 030	EA6B aircraft	MIDOS	2
10.00	24, 900	27 228	do	- 25602N W3317	4
14,00	24, 300	27,320	Imp fol-on It atk A/C A7E	W331/	2
•••••	2, 986	7 600	do	W1126	4
	., 	7,000	A/C systems flight support	WIIZO	2
	••••••••••••••••••••••••••••••••••••••	1 300	Passive angle tracker	W3349	4
		3 129	A/C system fleet support.	WAESS	
		3, 123	Hele system neet support	76612N	2
	1,243	1 332	Helo avionics system	W1409	4
			_	W1403	
41, 35	47, 850	95, 915	Subtotal		
			Strike warfare weaponryVLAP-1	. 62312N	3

R.D.T. & E., N-SOUTHEAST ASIA NOA, FISCAL YEARS 1969-71-Continued

Budget activity	Element project number	Title and name	Fiscal year 1969	Fiscal year 1970, current program	Fiscal year 1971, submit
3	63307N	Advance fuze design			
	W1127	Slant range fuze	1, 680 280	}	
3 .	W1134	Active IR fuze system	280	[Deleted]	
	WISIA	Air 7F Sparrow Missila system	2 226	j	1 400
3	25637N	Adv Sparrow. Alr 7F Sparrow Missile system A/L GM support. A/L GM FLT support. Surface missile system	3, 230	, 	1, 400
	W4705	A/L GM FLT support	3, 874	•••••••••••••	
3	_ 25638N	Surface missile system			
•	U1709	31413	2. 200		
3	_ 23033N W1104A	Shrike	6, 130	1,690	1,000
3	_ 25664N	TRI-SER Anti RAD missile		1,090	1,000
3	W1104	Standard ARM	10 877	4, 000	4,000
		Subtotal	30, 376	8, 232	8, 600
4	63401 N				
	W3410	Navigation satellite system. Tactical appl NAV SAT	954	•••••••	
4	_ 63402N	Satellite communication SHBD terminal for DSCS			
	S3213	SHBD terminal for DSCS	2, 000	2,718	5, 100
		Subtotal	2, 954	2,718	5, 100
5	62612N	Ships, submarines, and boats			
J	F35419	VIAD 2	9 200	1,500	1,400
5	_ 63502N	ADV mine C/M	2,300	1	1,400
	S2616	ADV mine C/M. Inland waterway mine C/M. EOD equipment. Shipboard damage control. Damage control.	1,085	[Deleted]	
5	U4734	EOD equipment	500) · · · ·	
3	_ 63514N S4643	Damage control	949		
5		Shipborne EW	343		
•. • • • • • • • • • • • • • • • • • •	S3307	Shipborne EWShip advance EW	24, 007	ì	
	S3318	L/R CM	4,600	[Deleted]	
5	U3632	Tact EWW deept River and shallow water W/F Defense against U/W swimmers	1,693	J	
J	S2705	Defense against U/W swimmers	2 273	1, 139	1, 475
	U3801		620	1, 139 482 2, 788	750
	S3802	Swimmer support sys. LTWT counterinsur WPN suit. Riverine warfare boats.	3, 615	2,788	2, 275
	U3811	LIWI counterinsur WPN suit	997	2, 249	
	S3816 W3817	Remote sensors for special W/F	1, 340	2, 249	2,500
5	. 6451 ON	Communications system			1,000
•	W3242	Airborne relay PUD	200		
5	S3285	Ships communication equipment	3.738	• • • • • • • • • • • • • • • • • • •	
5	- 64511N W3223	Intelligence systems. JNT inflt data trans, system		·····	
	W3637	Photo surveillance	145	[Deleted]	
5	_ 64512N	Electronic W/F system		í	
	W3301	Helo Decoy	509	Ì	
	W3322 W3323	Mobile Decoy system	3, 711	[Deleted]	
	W3338	EW environ simulator Airborne Tact SIG exploit system	2 100		
	W2241	Big Look		J	
5	_ 64513N	Big Look			
	W3314 S3315	ABN EW QRCShip EW QRC	2, 511	[Deleted]	
5	53313 64514N	Navigation system	1, 709	,,	
	63641	Night observation devices	233	500	1,000
5	_ 64517N	Joint adv. Tact CCCP	••••	••••	
5	S3129	Navy adv. Tact CCCP.	1, 534	988	2, 500
5	S3118	CIC conversion JR participating tac data system Samid	2, 813	2, 100	1,000
5	64521N	Samid	2, 613		
	114649	Shine antimissile integ detense	4 305	4, 000	2,000
5	_ 25655N	FLT electronics support. Electronics FLT support. Cryptologic activities.		• • • • • • • • • • • • • • • • • • •	
5	S4614	Electronics FLT support	5, 117	·	•••••
J	S3292	Class MAT destruction	512	[Deleted]	
		Subtotal	84, 644	40, 488	33, 850
6	_ 63601 N	Adv. mine development			
	112515	Destructor MK 36/40	2, 000	[Deleted]	[Deleted]
6	_ 63605N	Adv. conv. ord			
	W1133 W1140	AP/AM bomblet (Rockeye II) Adv. incendiary wpn	2, 700 500	2, 750 390	1, 575 600
	W1150	TIARA	573	J#U	
	W1184	OV-10 tgt. marking system	3, 000		
	W1190	Ltwt, 20mm gun pod	1, 516 500	8 51	1,000
	U1222	Polygon warhead adv. dev	500		

R.D.T. & E., N-SOUTHEAST ASIA NOA, FISCAL YEARS 1961-71-Continued

Budget proje activity numb	t	Fiscal year 1969	Fiscal year 1970, current program	Fiscel year 1971, submit
64603				
W110		500	100	
W111		999	995	1,000
W112		2,000	2, 354 1, 193	1, 500
W115	Improved 20mm GP projectile	999	1, 193	1,00
W115	Hart (ZAP)	8, 897	2, 687	2,500
W116			2,600	1,000
64605			7,000	-,
U120	LW gun weapon system	3, 760	1,740	1,690
Ŭ120	Bombardment rocket		2,860	-,
U120	RKT assisted project	2, 178	A15	
Ŭ121	LR bombardment ammo		850	
U122	5-inch sidekick polygun warhead	500	850	
	MC and combat VEU aveter	500		
64606				
CS43	Lt Assit Lt amphib vehicle		5, 200	1,500
CW46	Multi shot flame	893		`500
25641				
W470				
U472	S/L ORD FLT support	1,/95 .	· · · · · · · · · · · · · · · · · · ·	
25645	I WALLEYE II		 . 	
W110		5. 660	3, 088	600
25647	Hero FLT support			
114724	do	920		
26618	MC OP weapons and ordnance		· · · · · · · · · · · · · · · · · · ·	
CW11	OP weapons ordnance development.	3, 602 .		• • • • • • • • • • • • •
	Subtotal	57, 595	27, 673	14, 465
63705	N ADV logistics			
W111	Imp A/C rearm	600	400	• • • • • • • • • • •
63706	Adv med development	600	-30	• · · · • · · · · · · · · · · · · · · ·
M430	Aus med. desemblinent	2 221	2 070	9 754
63709	A	3, 221	2, 9/0	2,730
03/03	Adv. Marine BIO system	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
U381: 63710	00	1, 492	· · · · · · · · · · · · · · · · · · ·	
	Other MC adv. development		 .	
CS47	Squad radio	249 .		
CS47	Guad radio Tact ECM system Tact msg. dist. and voice comm. Other MC systems Magis Speed		100	• • • • • • • • • • • • • • • • • • • •
CS470	Tact msg. dist. and voice comm		450	500
64704	M Other MC systems			• • • • • • • • • •
CS463	Magis	850	1,000	1,000
CS50	Speed	1,800		
26611	FMF exped, airfield subport SATS			
WASO	SATS	1 005	500	
26617	MC oper logistics development	1,033	300	
CS43	do	262	700	550
26619	4 MC OD clastociae development	302	/00	
20013	MC OP electronics development		7 200	2, 015
CS289		1,/5/	7,200	2, 013
	DEF commun. plan group			
W365	M MC OP electronics development do. DEF commun. plan groupdo	9, 720 	[Deleted]	[Deleted
	Subtotal	21, 146	20, 910	11,815

REDUCING PROGRAMS COVERED IN R.D.T. & E. BUDGET

Senator McIntyre. Considering the total content of the Navy R.D.T. & E. program, are there any items in it which you consider more appropriate for inclusion in other appropriations?

I would like you to really take a look at this and have somebody staff it, and also the converse of this question: What do you have in other appropriations that you believe should more truly be in the R.D.T. & E. account?

Dr. Frosch. Yes. Now, in deciding what is in R.D.T. & E. or not in R.D.T. & E., we are following a set of carefully defined formal DOD rules

Senator McIntyre. Well, then, what you had better do is set the rule out and show us where these things occur, and we can disagree with the rule if you want.

Dr. Frosch. In fact, over the past couple of years, we have been—Senator McIntyre. Then let us have it.

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Dr. Frosch. Understand, over the past couple of years, we have been engaged in, I guess the term is budget purification, and moving some things in and out of R.D.T. & E. and trying to make that line better drawn. I would hesitate to say that we have come to the end of that process or that everything is sorted out as well as may be. We removed the whole category of line items that used to be in operational systems development which were for general support of the fleet for newly developed items in general areas such as air ordinance and ship ordinance, and so on.

There are always some questions of whether a particular improvement to a system is of the character that it should be called a product improvement and be funded under a procurement budget, or whether it is sweeping enough so that it should be called a development and be

included under R.D.T. & E.

Clearly, if one makes a minor change to a system, like changing the size of a bolt, or kind of bolt, that is a product improvement. If it is a sweeping improvement, it is a development. So there is always the

judgmental problem here.

Senator McIntyre. All I really want, all I am striving for here is in looking over the R.D.T. & E. budget. I resent any substantial item that is in that portion of the budget that should be over in the procurement; just like I resent the Commerce Department not carrying their load, just like I resent the State Department not doing their job as we see it.

Dr. Frosch. I clearly, obviously, share your sentiments, and we work on that.

Senator McIntyre. It is only to that. I do not want to know whether the bolt that goes on an amphibious vehicle—I do not want to get that detailed. Just indicate any places you feel that something in this rule, even if this rule works against you, that you do not think is appropriate for R.D.T. & E. And the converse, too.

Dr. Frosch. Actually, an interesting example is this question of the six F-14 aircraft that were moved from procurement aircraft and

missiles into R.D.T. & E.

Senator McIntyre. Who moved them?

Dr. Frosch. Congress, sir.

Senator McIntyre. The Congress did?

Dr. Frosch. They were put into PAMN originally under an OSD control rule that said any aircraft, even though used for tests, that were eventually expected to end up in fleet operations, whether for training or otherwise, should be procured under procurement and not under R.D.T. & E. The Congress felt, rule or no rule, that because they were required in the test program and because they did not wish to appropriate any production funds at that point, they should be moved into R.D.T. & E.

Senator McIntyre. Will you provide for the record what your financial reports as of January 31, 1968, 1969, and 1970 would show for

the following, aggregated by program year:

a. Approved program;

b. Cumulative obligations; c. Unliquidated obligations; and

d. Unexpended balances?

Dr. Frosch. Yes.

(The information follows:)

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FINANCIAL STATUS.—RESEARCH, DEVELOPMENT, TRAINING, AND ENVIRONMENTAL APPROPRIATION (INCLUDING REIMBURSEMENTS)

(In millions of dollars)

	Jan.	31, 1968	Jan. 31, 1969	Jan. 31, 1970
Approved program		2, 386	3, 016	2, 558
Unobligated balance brought forward New obligational authority Cumulative obligations Unliquidated obligations Unexpended balances		824 2, 102 1, 430 1, 207 2, 164	710 2,306 1,706 1,502 2,813	151 2, 407 1, 669 1, 757 2, 646

Senator McIntyre. Will you provide for the record a list of all the programs and projects in your fiscal year 1969, 1970, and 1971 R.D.T. & E. programs relating to VTOL, V/STOL aircraft, and helicopters. Indicate what coordination exists with the other services to insure avoidance of unnecessary duplication and permit interchange of technology.

Dr. Frosch. Yes.

(The information follows:)

There were two projects in this area in the FY 1969 RDT&E program: The X-22A Research Aircraft, and the Helo Escape and Survival System. The X-22, originally part of the Tri-Service V/STOL Development Program begun in 1960, was built with special features which allow simulation of a wide range of V/STOL configurations to determine stability and control requirements for future V/STOL aircraft. The aircraft was delivered to the Navy in May 1969. Advanced Development RDT&E funding for the X-22 was completed in FY 1969; however, research under Exploratory Development will continue with Navy, Army, Air Force, and NASA participation. The Helo Escape and Survival System, which entered Advanced Development in late FY 1969, is to provide a means for helicopter occupants to escape from inflight emergencies since the usual low flight altitudes and whirling rotor blades make either parachute or ejection escape extremely hazardous. This project is unfunded in FY 1970 and is modestly funded in FY 1971.

The High Speed Helo Rotor, funded in FY 1970 and 1971, is a concept with the objective of increasing helicopter speed by means of the Reverse Velocity Rotor (RVR). The RVR is designed to minimize retreating blade stall and delay advancing blade compressibility effects. It may prove feasible for retrofit to

certain types of service helicopters as well as future designs.

Coordination with other services to avoid unnecessary duplication and permit interchange of technology is accomplished both formally and informally. On a formal basis, requirements documents of each service are reviewed by the other services to determine similar or related requirements, material in being or under development to meet similar requirements, and whether participation in a joint development effort is desired. If joint development is not warranted, the other services routinely arrange to monitor the developing services' efforts unless there is no application to the monitoring service. The services also maintain open exchanges of information at the technical and operational levels. As an example of one service benefitting from another's development efforts, the Navy Helo Escape and Survival System will include certain features developed by the Army, such as self-sealing fuel tanks, impact attenuating seats, and fire detection and extinguishing devices. As another example of coordination and exchange of information, while the Navy is proceeding with Advanced Development of the RVR, the Army and Air Force are each investigating another concept which could lead to higher speed and better performance in helicopters. Each of the services is aware of the others' efforts, and if one concept proves more advantageous than another, any service has the option of applying the proven technology to its particular helicopters.

Senator McIntyre. In your statement you describe as the result of your research program, a complete and automatic time-based Program Evaluation Technique/Control Path Method (PERT/CPM) sched-

uling procedure which permitted the Portsmouth Naval Shipyard to overhaul the Sam Houston (SSBN 609) in record time, cutting 3 months off the norm. Isn't it ironic that such efficiency reduced the shipyard workload so that its employees recently were able to sustain a 15 percent cut which hit many shipyards across the country?

Dr. Frosch. That is sort of half in R. & D. and three quarters out

of it.

Senator McIntyre. You had better reply in someway so we can keep it in the record.

Dr. Frosch. Yes, sir. I do not think there is any problem in agreeing that it is ironic, sir.

(The information follows:)

PROGRAM EVALUATION REVIEW TECHNIQUE/CONTROL PATH METHOD (PERT/OPM)

Our goal in the development and application of PERT/CPM procedures to shippard use was the achievement of improved efficiency in overhaul and repair operations. This objective is certainly consonant with Congressional desire that Navy industrial practices reflect enhanced time, cost and performance improvements.

Reductions in shipyard employment recently announced derive from reduced operating forces and consequent overhaul and repair workload decreases.

EDUCATION AND TRAINING DEVELOPMENT

Senator McIntyre. In your statement, you describe an advanced development program in education and training development. Although the need for such a program can be understood, why isn't it being maintained at the fiscal year 1970 level of \$2.3 million instead of

the proposed level of \$3 million in fiscal year 1971?

Dr. Frosch. Well, in these areas of training and education and manpower improvement, this is another area in which the payoff for successful development in increased efficiency and operation in the fleet has seemed to us to be so high that we were ashamed of the amounts we were spending on the development, because this seemed to be work that would really improve the Navy in all of our operating areas. So we have tried specifically to increase this.

One very important area where it is important to do this is connected with retention; fitting the man to the job and training him for the job appears to be quite important in the question of whether people are willing to stay in the Navy in highly technical jobs. Retention is the problem which is on the Secretary of the Navy's mind most. In this kind of development, we hope we can give some assistance to that problem.

Senator McIntyre. What category of social and behavioral sciences

is this in &

Dr. Frosch. This would be education and training.

Senator McIntyre. There is no such thing. Human factors.

Dr. Frosch. We have a specific title that we need to find.

Senator McIntyre. Off the record.

(Discussion off the record.)

Dr. Frosch. Part of the problem is that all of these things are called under the title of "Social and Behavioral Sciences," and I think the thinking of many of the people in the Senate and in the Congress generally attaches them not to questions like education and training



and selection, but the thinking is always about some of the foreign military and policy kinds of problems, which are only a small fraction of the total.

This particular item that you mentioned is in the area that we referred to as manpower selection and training, which is under the gen-

eral social and behavioral sciences.

Senator McIntyre. As I said, that made a lot of sense to the Subcommittee, and it was just unfortunate that we had this big column, scientific research, and as a result, we just were not able to defend this. I could not do much with this foreign research and money being spent at the University of Athens for example to study something about volcanic ash or something of that sort.

Mr. Chairman, would you like to ask a question? Chairman Stennis. No, go ahead. Thank you.

SURFACE MISSILE SYSTEM PROJECT

Senator McInter. Mr. Secretary, the purpose of the Surface Missile System Project, for which you are asking \$7.9 million to develop and test component improvements for the TERRIER, TARTER and TALOS systems, appears to overlap the engineering development program 3-T Major System Development for which \$14.2 million are requested. Will you explain?

Dr. Frosch. I believe Captain Sappington is here, and he can

answer that.

Captain Sappington. The 3-T Major Systems Developments are principally for the improvement of the performance for the systems which we have at sea. The improvements of performance are in the areas of target detection and systems reaction time—that is, to reduce the reaction time and to counter the hostile electronic warfare environment which the enemy can impose on us. The surface missile system project element is basically to provide improvements in the reliability and maintainability of the systems we have in the fleet, not associated, however, with improvements in performance; that is, not reaching out to greater range or higher flying aircraft.

Senator McIntyre. That is a pretty fine line of distinction between

the two areas of work. One is improving-

Captain Sappington. Performance.

Senator McIntyre. Improving performance, and the other is what improving the reliability?

Captain Sappington. And maintainability by officers and men at

sea, ves. sir.

The first one, for improvements in performance, is associated with trying to stay abreast of the threat as it increases in severity. As the threat increases its performance, we have to improve our performance. The other is to keep these systems operating in a more efficient fashion, in a more maintainable fashion so that we can reduce the total maintenance personnel for example onboard ship, or reduce the number of adjustments that you have to make in the radar, and so that you can maintain them in a high state of availability.

Senator McIntyre. Do you oversee both of these programs?

Captain Sappington. Yes, sir.

Senator McIntyre. And you see that there is a difference between the two?

Captain Sappington. Yes, sir.

Senator McIntyre. All right, thank you very much.

MACHINEGUN DEVELOPMENT

Mr. Secretary, you mention under your Strike Warfare Weaponry exploratory development element that you will be working on a machinegun [deleted]. That is a rather fascinating idea. Will you explain how this can be done?

Dr. Frosch. I would like Admiral Davies to explain that.

Senator McIntyre. Very well. Admiral Davies. [Deleted.]

Dr. Frosch. [Deleted.]

Admiral Davies. And fire at targets [deleted].

Senator McIntyre. That is in the exploratory stage?

Admiral Davies. Yes, sir.

Senator McIntyre. Would you please furnish for the record what we are spending on that? Dr. Frosch. Yes.

(The information follows:)

The [deleted] machine gun Exploratory Development costs have been \$100,000 and \$111,000 for Fiscal years 1969 and 1970, respectively. An additional \$100,000 is required in FY 1971 if the concept is to be available as an Advanced Development candidate in FY 1972.

Senator McIntyre. Why can't the objectives of the [deleted] program for which you ask [deleted] million in fiscal year 1971 compared with [deleted] million in fiscal year 1970 be satisfied by other [deleted] programs of the Air Force or other DOD agencies! Aren't [deleted]

the responsibility of the Air Force?

Dr. Frosch. The problem of [deleted] of ships at sea is a peculiarly naval problem. We want it for tactical purposes as opposed to longrange [deleted] purposes, so we want a continuous real-time capability. We need a [deleted] for this purpose so that it can [deleted]. In the winter in the North Atlantic, most of the time it is cloudy, and you have to use [deleted] the sea surface. We are not yet in the stage of developing a [deleted]. Should a [deleted] be developed, it will be [deleted] by the Air Force, [deleted].

It should also be mentioned that [deleted].

Senator McIntyre. The [deleted] million, then, goes to the Air Force?

Dr. Frosch. [Deleted.]

Senator McIntyre. The Washington Post of March 1, 1970, carried an article entitled, "Navy Optimum Man-Machine System Runs Into Rickover." The subject of this article was was a 71-page draft plan for a human factors program "to develop optimum man-machine systems through the integration of human performance data and equipment performance data during research, development, training, and engineering." The newspaper reports that Admiral Rickover was one of 21 high-ranking officers asked to comment. He is reported to have replied that the scheme "will require about as many additional people as are now engaged in doing technical work"; and "New large organizations—a vast new social science bureaucracy contributing nothing to the building of ships—will have to be set up." In addition, that—

It will add another monstrosity to our already vast administrative burden; it will increase the cost of shipbuilding, it will make us a laughingstock.

Since this involves behavioral and social sciences, which have been criticized by the Congress, will you identify the programs and the amount of funds and people included in your fiscal year 1971 budget for this purpose?

Dr. Frosch. Zero.

Senator McIntyre. And would you care to comment on the article? Admiral Ruckner. I should be delighted, because my name was mentioned in the article.

Senator McIntyre. All right, go ahead.

Admiral Ruckner. This is beyond the capability of the people to use it. It is not of any use to us to produce a system that is enormously capable and then get only half the performance out of it because the people cannot keep it up or cannot operate it. So about 6 years ago, we made a concerted effort to insist that in the developing agencies, they look at the man-machine relationship so that the people and the machine were fitted together so that each could do his job in the best fashion.

Now, in the course of 6 years, a few very energetic people produced an enormous plan for carrying out what is really basic to every one of our developments. And of course my people in the man-machine relationship or human engineering world commented on it. I think most of the Systems Commands commented on it. I am sure Admiral Davies commented on it and Admiral Gallatin took the comments and went back to the people who had written this proposed plan and told them they were going to rewrite it.

But of course, the fact that Admiral Gallatin had also disapproved this enormous structural setup that they had suggested does not appear in the article. So I do think we are on reasonable grounds.

I think everybody in CNM was trying to do a sensible job of being sure that the people and machines work together in a complementary fashion. Admiral Rickover has a very neatly turned phrase and I think his objection to the basic plan was valid, but many other people had the same objection.

Admiral Davies. I would like to add to that that since this was in my office that it happened, this plan, when it first came to me, when it appeared on my desk, I had exactly the same reaction: It is a great idea, but an extremely poor and ill-advised way to try to do it. This was actually about 2 weeks before Admiral Rickover wrote his memorandum. I did not know at this point that it had gone out to him. So in essence, we are all in agreement.

Dr. Frosch. I would sum up in a previously used elegant phrase, I would think this is a case where Admiral Rickover ended up beating a dead horse.

Senator McIntyre. But it is a very real problem.

Dr. Frosch. The problem is a very real problem. It is one that we do attack, would like to attack more systematically, but not if it is going to mean building up a vast and unnecessary system for doing it. We do try to do this, but whether we want a gigantic bureaucracy to do it is an entirely different question. We do not. We want to do it as

a part of an efficient engineering process, and that is what we shall

look for in a way of doing it.

Senator McIntyre. I am no scientist, I do not have very good grounding in the physical sciences. It may be because of the briefing I had last year on the human factoring and performance and training, but when I walked aboard the P-3—what is that ASW plane?

Dr. Frosch. The P-3 is correct, sir.

Senator McInter (continuing). The P-3, the old Electra, to me, flying a plane would be just the most complicated thing in the world. I suppose to a seasoned aviator, it is not that complicated. But all these positions are stationed in this P-3 and the pilot is being told a great many things in front of him such as when they pick up the sounding of a submarine or something; he is being told what he should do, what course, what azimuth, or whatever. All of a sudden you have the feeling, how in the name of goodness is the man going to fly the plane and take all these directions coming over to him on these acoustical, sonar, and every other kind of thing they have in there?

Dr. Frosch. Yet I think that system can be described as one in which a good deal of careful work done on the human engineering, and the question of what information should be presented to the pilot, what information should be presented to the tactical control officer, and how to tie all that together, and in fact, the techniques for doing that, for presenting the displayed information so that it helps the pilot rather than confusing him, which could be the result of doing it badly, has come out of, I guess, 20 years of work and a long program that started in the Office of Naval Research on ways to present information to an operator so that it is meaningful to him and not confusing.

Admiral Davies. The Senator may have been looking at an early

P-3. How long ago was that?

Senator McIntyre. You must remember, they all look pretty com-

Admiral Davies. But my point is what Dr. Frosch is describing is a

new display that went into the P-3C, which is a very new thing.

Senator McIntyre. The one I saw was down at Key West. They said they had two full crews, they had the plane out there, and they were in the process of training the crews as to how to operate. What was it? $\mathbf{Tom}\,$

Captain Ball. It was a P-3C.

Senator McIntyre. To me, it looked very complicated.

Admiral Davies. But my point is what Dr. Frosch is describing is a Admiral Ruckner. The pilot needs to watch some of those things rather continously; other things he needs to glance at only once in a while; and other things, he only looks at when he thinks there is some trouble.

SHIP CONTRACT DEFINITION PROGRAM

Senator McIntyre. Mr. Secretary, a request is included for \$10 million to support the ship contract definition program. You state that this program was held in abeyance in fiscal year 1970 and thus reflects an increase as it is reinstituted in fiscal year 1971. Will you explain why this should be reinstated, and specifically how you plan to use these funds?

Dr. Frosch. These funds are for contract definition. That is, for defining precisely what are the characteristics, costs, and major de-

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sign features of specific ships that are to be built. Tentatively, the ships that might be included in contract definition in fiscal 1971 might be further work and contract definition on the DXG if required; the CVAN if required; and the landing force support ship. The particular ship or ships on which this contract definition money will be spent will be chosen by the Chief of Naval Operations. It is in the R.D.T. & E. budget as the result of a decision that this type of contract definition and early design should be done in an R.D.T. & E. way, even though, when metal is cut and the ship is built, it is built under "Ship construction funds."

Senator McIntyre. Have you told me how they plan to use the

funds?

Dr. Frosch. I have told you the ships that might require these funds. There has been no final decision by the CNO on what ship we would like them applied to.

RELATIONSHIP WITH NEW SHIP DESIGN PROGRAM

Senator McIntyre. Will you explain the relationship between that program and the program "New ship design" for which you request \$8 million?

Dr. Frosch. Now, the new ship design is for concept formulation; that is, we define two stages in any definition of a ship or another weapons system. The first is where you are trying to untangle just generally what kind of ship it should be, what sort of armament, and general size. That is essentially an in-house process usually, although there may be assistance from contractors. The contract definition is the specific beginnings of the design leading to a contract for a particular ship.

In fiscal 1971, under new ship design, we shall be looking at advance

concepts for nuclear submarines and for aircraft carriers.

NUCLEAR PROPULSION AND REACTOR PROGRAM

Senator McInter. "Nuclear propulsion exploratory development" for \$19.8 million and "Reactor propulsion plants advanced development" for [deleted] million represent a continued level of more than [deleted] million for nuclear power plant development. Do you anticipate that this dollar level will continue indefinitely, or do you see a tapering off of the need to pursue this technology?

Dr. Frosch. I think we shall have to continue to pursue this technology. It is also important to note that this is a part of a total program. This is the Navy funding for the naval portion of the nuclear propulsion program, which is related to the AEC funded part. The AEC funded part runs usually about [deleted] as much as the Navy. The Navy funding is for the ship-peculiar portions of naval reactors. The AEC funding normally is for the reactor portion of the plant.

This money has made possible major improvements in the lifetime of nuclear powerplants that can be used on naval ships, welding techniques for reactor vessels, decontamination procedures so we can reduce the costs of refueling, and so on. We are continuing to improve the lifetimes and the capabilities of naval nuclear powerplants, looking for higher speed, and consequently, higher powered submarines. The

funding for out-years—that is, for the years beyond 1971—is predicted to be basically level.

Senator McIntyre. Well, Navy does not spend this money? A good

share is turned over to AEC?

Admiral RUCKNER. It is spent by Admiral Rickover.

Dr. Frosch. The Navy money is controlled by Admiral Rickover in his position as Deputy Commander for Nuclear Propulsion in the Naval Ship Systems Command. The AEC money that I referred to is in the AEC budget and is controlled by Admiral Rickover as Director of the Division of Naval Reactors of the AEC.

The two portions of money are both controlled by Admiral Rickover, and used for work at the AEC-owned Bettis Atomic Power

Laboratory, the Knolls Atomic Power Laboratory.

LAB LOCATION

Senator McIntyre. Where are those labs located?

Dr. Frosch. Well, Bettis is operated by Westinghouse and is located at Pittsburgh. Knolls is operated by General Electric and is located at Schenectady, N.Y.

Chairman Stennis. Would you yield to me just a moment?

Senator McIntyre. Certainly.

Chairman STENNIS. Admiral Rickover spends this money but charges it to the Navy? I mean, he spends it with AEC, but you have

to pay the bill; is that right?

Dr. Frosch. No, the money that is in the Navy budget is for the Navy portion of the reactor plant, that is, the design and development of those reactor plant components peculiar to Naval application and for associated engine room components. The AEC-funded part is for the development of cores, reactor designs, and so on. He controls both, but the money is segregated, the Navy part being the Navypeculiar part, the AEC part being the reactor design.

Chairman STENNIS. And this runs at a [deleted] million per year

level now?

Dr. Frosch. Combining the exploratory development and the ad-

vanced development portions of the element.

Admiral RUCKNER. In the advanced development portion, that money goes into specific designs of [deleted] different plants: The [deleted] plant for the Nimitz a class two reactor for aircraft carriers: the [deleted] plant of the Narwhal; the [deleted] plant for the small combatants. Those are the EDG types; the [deleted] plant which is in the high speed 688 submarine; [deleted].

Chairman Stennis. Which one of these is the plant near Roanoke? Admiral Ruckner. Our operating prototype plants are located near Arco, Idaho; West Milton, N.Y.; and Windsor, Conn.

Dr. Frosch. That, I think, is the Virginia Electric Power Co., and I believe that is a different design of reactor. That was an AEC design that I do not believe came through Admiral Rickover's organization.

Chairman Stennis. All right, thank you.

Senator McIntyre. Thank you, Mr. Chairman.

SECRETARY PACKARD'S DECISION ON AAM SYSTEM

Mr. Secretary, a requirement is included in your budget for [deleted] million to support advanced development of an Advanced

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Air Launched Air-to-Air Missile System (AGILE). The Air Force is pursuing a similar program Short Range Air-to-Air Missile (AIM-82) and has requested \$37.2 million for fiscal year 1971.

Secretary Packard's decision of January 28, 1970, is stated as

follows:

On the basis that the Commander, AFSC, and the CNM have advised me that the Navy and Air Force requirements and schedule for the SRM are compatible and workable and that it is premature to recommend a joint management plan, I herewith approve only the next step in the SRM program. The Air Force will conduct competitive design competition with industry (reflecting joint Service requirements as well as they can be defined) and the Navy will proceed with its AGILE technology program, both within present funds. On or about July 1, 1970, the Commander AFSC and the CNM will advise me of their recommendations leading to a single missile for joint Service and multiple aircraft use.

I specifically request that the Services set a meaningful cost bogey for the SRM as soon as possible and that full consideration be given to a comprehensive upgrading of one of our present AAM (e.g. SIDEWINDER) as a low risk interim step.

JUSTIFICATION OF NAVY'S BUDGET REQUEST

Since the program decision will be delayed until after July 1, 1970, and \$9.6 million of Air Force fiscal year 1970 funds are still deferred, what justification is there to provide the [deleted] million requested by the Navy for fiscal year 1971? Depending upon the decision, wouldn't the \$37.2 million be more than adequate to pursue any alternative which may be selected either for the Air Force or Navy or a combination of both?

Dr. Frosch. Well, we think it is possible that the decision might be to continue both technologies and effectively put the two services and the two service concepts into competition for a longer period. If that is the case, then the [deleted] million is intended to continue the

Navy technology.

I might say what the argument is, both technically and in program. The Air Force so far has been looking principally at solving this problem with an [deleted] missile; that is, one with [deleted] so that it is [deleted]. We believe that for the requirements of the missile, that technology will not go far enough. We are looking at the technology at the technology will not go far enough.

nology of [deleted].

Because we feel that getting these requirements requires more advanced technology, we believe that it will take longer, and the Navy feels that it will be [deleted] before we would arrive at the stage where we would want to go to contract for an actual construction of full prototypes and full engineering development. The amount of money that we are asking for is that which is adequate to continue the technological work.

The Air Force believe they can get there through the [deleted] route, and they can go through full contract definition sooner. And it is possible that a competition between the two will be the decision that is the best for development, although it is essentially certain that we

will not produce two missiles.

Senator McIntyre. Well, this is an area where, if we cut the [deleted] million in advance, you probably could get hold of some contingency funds or intradepartment transfers to continue your technology. It would certainly be an example of where a delay in application of 1970 funds could permit a cut in 1971, would it not?

Dr. Frosch. Except that to continue the program that Mr. Packard had approved, we have had or are now having a reprograming of 1970 funds just to continue the work that has been approved. That is a reprograming of [deleted] million.

You see, the work in 1970 has continued. It has not been delayed. In fact, the decision was not a decision to turn something on but

rather to not turn it off.

EFFECT OF DELAYED DECISION

Senator McIntyre. Mr. Fine, please.

Mr. Fine. The point really is that since the Air Force has a request in for \$37.2 million, plus some \$9 million that has not yet been released, notwithstanding the reprograming that you mentioned, the Secretary of Defense does not decide immediately upon receiving the recommendations on July 1 and there is a delay in his decision. This could well have the effect of reducing the fund requriements for 1971.

Dr. Frosch. It could have such an effect.

Admiral Davies. Except that his decision to continue the advanced development program could have that effect.

Mr. Fine. But if you consider the total fund availability between the

two services, it could have that effect.

Senator McIntyre. How much do they have available?

Mr. Fine. \$9.6 million plus \$37.2 million plus \$2.0 million, for a total of \$48.8 million.

Dr. Frosch. I would point out that if there were a decision to delay making a decision, which is what I think we are talking about, then I think the likely thing to do would be to agree to continue the development of the technology while delaying entry into contract definition. So that would seem as though the likeliest thing to continue would be the Navy technological effort, with a delay on the Air Force effort. There may be the opposite combination, but I do not see how we could come by it.

Senator McIntyre. Keep it in mind.

Airborne, ship, and submarine sonar effort is spread among a number of different programs in your estimate. Will you provide a list of programs and projects, by title and amount, for fiscal year 1969, 1970, and 1971 together with a brief discussion of their interrelationship?

Dr. Frosch. Yes.

(The information follows:)

SUBMARINE SONAR SUMMARY

Element	Project		R.	R.D.T. & E. funding			
			Fiscal year 1969	Fiscal year 1970	Fiscal year 1971		
63504 N 63504 N 63535 N 64503 N 64503 N 64503 N	\$2305 \$2318 \$2240 \$2329 \$2331 \$2332	AGSS sonar. Acoustic Communication New DD/New subsonar SSN Sonar FBM Sonar. BQS-13 DNA Sonar.	1. 970 2. 664 1. 000 2. 387 6. 739 9. 267	1. 454 4. 962 2. 000 [deleted]	2, 000 2, 500 2, 000		

Discussion of interrelationships:

The Dolphin Sonar is designed to determine the practicability of, and gains to be derived from, sonar use in the deep ocean. The acoustic communications project includes the Azores range work and should reduce the submarine services required in the development and evaluation of an underwater communications system. The SSN and SSBN sonars are improvements to our FBM submarines to upgrade their equipments to the state-of-the-art. The BQS-13 DNA is an upgrading of the SSN sonar to the state-of-the-art. All the above efforts will lend data to the development of the New DD/New Sub Sonar which is the future sonar for future submarines and destroyers with maximum common component usage and maximum performance to counter the projected '75-'90 threat.

SURFACE SHIP SONAR EFFORT

[In thousands of dollars]

			Fiscal year—		
'Element	Project	Title	1969	1970	1971
63505N 63505N	S22AA S2239	Joint U.S./U.K. sonar SQS-26 LF SQS-26 sonar	}[Deleted]		
25623N	\$2202	SQS-26 sonar	3, 000	3, 500	3, 000

Project S2202, SQS-26 Sonar, provides near-term improvements to the SQS-26 sonar system. Particularly, it will correct the [deleted]. The project also provides for sea tests under [deleted] and P/8-5 (Op-Appraisal).

Project S2239, SQS-26LF, provides a [deleted] by providing [deleted] operat-

ing frequencies. This project will also produce gains in performance and opera-

bility.

Project S22AA, Joint US/UK Sonar, is an experiment in the [deleted] utilizing a [deleted]. The US will provide the [deleted] and the UK will provide the [deleted] as well as the ship platform. This project is not directly related to the other two surface sonar projects; however, it will provide us with the knowledge as to whether or not a [deleted] sonar is a productive way to proceed in any future development.

Airborne projects that fit this category are the following active sonobuoy projects.

	1		
Title	1969	1970	1971
Command active sonobuoy system (CASS)	3, 093, 600 1, 000, 000	2, 700, 600 2, 200, 000	2, 150, 000 6, 600, 000

The CASS project will provide for anti-submarine aircraft a much-improved [deleted] sonabuoy capable of tracing submarines at speeds up to [deleted] knots. A follow-on [deleted] CASS (DICASS) sonabuoy will permit aircraft to track these submarines with fewer sonabuoys. Both CASS and DICASS are classed as localization sonabuoys. Investigation of improvements in active search sonabuoy systems [deleted] is to be conducted within the Advanced Acoustic Search Sensor Project. These systems will exploit the [deleted].

The major interrelationship of the airborne, ship, and submarine, sonar efforts is the environment in which systems are employed. While some techniques are adaptable between the three type platforms, the basic difference is that airborne systems are expendable. The major commonality is in ship and submarine active

sonars

DUPLICATION IN SURFACE CRAFT DEVELOPMENT

Senator McIntyre. The advanced development program, "Advanced Surface Craft," for which you are requesting \$11.2 million to develop air cushion vehicles and hydrofoil craft for amphibious assault purposes, is similar to the objective of the Surface Effects Ships Advanced Development program included for \$20 million. Is there any

overlap or duplication between these programs?

Dr. Frosch. Not really. There is a connection in that some of the technology is a similar kind of technology. The Advanced Surface Craft is now in the stage of where a particular kind of vehicle, an air cushion vehicle, has been selected as the first developmental type of craft that we would like to go to. There we will be developing a very specific model of an air cushion vehicle for this particular amphibious purpose, and it does not appear to require any major advance in the air cushion vehicle technology. The technology in the surface effect ship area is pushing the kind of technology that can be used for a large ship, not just the existing air cushion vehicle technology that can be used for an assault boat. So I think there is no overlap.

RELATIONSHIP OF MISSILES AND HELICOPTER PROGRAM

Senator McIntyre. Will you describe the relationship between the Ship Anti-Missile Integrated Defense (SAMID) program, estimated at \$6 million for fiscal year 1971, and the Destroyer Helicopter System (LAMPS), for which you are requesting \$13.5 million?

Dr. Frosch. The SAMID program provides rapid incremental improvements in capability of Navy ships to defend themselves against antiship missiles by planned integration of ships weapon, radar, and electronic warfare systems. The LAMPS is a longer range program to select a helicopter which could be used on various ships for some ASW, for some electronic warfare, for some sensing, and for some weapons delivery and logistics purposes. They are really entirely different directions of development for somewhat different purposes.

Senator McIntyre. That is one thing we are working on now. Admiral—is it Belling?—has been over with us—I guess just absolutely

floundering here on all these ASW weapons.

Admiral RUCKNER. That is not Admiral Belling; that is Admiral

Healey.

Senator McIntyre. We have not bothered Admiral Caldwell yet. We may bring him in because he is such an excellent witness. But to try to get the breadth of all of these antisubmarine warfare weapons—because this LAMPS, that is really an ASW.

Admiral RUCKNER. No.

Dr. Frosch. No; the intention in LAMPS is a general-purpose helicopter for a lot of purposes, of which ASW would be only one [decopter for a lot of purposes, of which ASW would only be one. [Deleted.] Probably that is a more important mission for the LAMPS helicopter than ASW.

UNDERSEA WARFARE PROGRAM EXPENDITURE

Senator McIntyre. Your statement indicates that under your exploratory development program, "Undersea Warfare Weaponry," you are exploring a submarine [deleted]. How much money have you spent on this and how much are you seeking in fiscal year 1971?

Dr. Frosch. In 1970 and prior, we shall have spent a total of a million dollars, and we are seeking \$1 million in 1971. This is in, principally, computation and examination, and some experimental work in laboratories to define what a reasonable concept for such a [deleted] might be.

Senator McIntyre. Well, with all the tactical munitions delivery capability, both conventional and nuclear, available in the Army, Navy, and Air Force, what justification is there for a submarine delivery capability?

Dr. Frosch. This is for a submarine to attack either surface ships

or other submarines.

PURPOSE OF MK-48 TORPEDO

Senator McIntyre. My goodness sakes, we are about ready to go into a program for the eighties that will be costing the taxpayers about \$3 billion, called the MK-48 torpedo. What is this going to do? The MK-48 is so great it even talks.

Dr. Frosch. The MK-48 has a range in the order of [deleted] yards. The question that is raised here is, is there a possibility of

a weapon with a [deleted].

Is that an interesting weapon concept for us to attack either surface ships or submarines at very long ranges? In a way, the question might be put, Is there a missile concept that might in the long run make the torpedo obsolete?

At this stage, we are trying to decide whether in fact this is a sensible thing to go ahead with and what such a weapon might be

like.

Senator McIntyre. Well, this weapon is looking to the [deleted]. Dr. Frosch. It is certainly not to be in the fleet, I would think, before [deleted].

Senator McIntyre. Not before.

AVIATOR STUDY PROGRAM

Under your life sciences exploratory development program, for which you are asking \$6 million, you mentioned that the current phase of the 1,000 aviator study will be completed. You also state that this sample has been followed for about 20 years. Will you explain

this program?

Dr. Frosch. Yes. This was a program that was an attempt to find out by a long-term study what the various factors involved in the health of naval aviators were, and in order to make sense out of how these men's health goes through their careers and to find the factors, one needs a large sample. So they selected a thousand and started doing annual extra-careful physicals and special tests on them to see whether it was possible to make correlations of their health with various factors in the career patterns in the kind of assignments they had, the kind of work they did, their body types, and see, for example, whether there were connections between various types of training and combat assignment, and so on, such as the incidence of heart disease. It takes a long time to do this and a lot of people. because of the original thousand—I do not remember the precise numbers, but I think they are down now to a smaller fraction who are still in the Navy and still active naval aviators. So this is a longterm health study of a particular type.

Senator McIntyre. Who is in charge of that program?

Dr. Frosch. This would come under the Surgeon General of the Navy. The work is under the control of the Naval Aerospace Medical



Research Laboratory, at Pensacola and in cooperation with some of the other groups.

Senator McIntyre. We are going to write the Surgeon General and

ask him how this program is coming along.

Dr. Frosch. Fine.

Senator McIntyre. You do not know what the results are so far? Naval aviators are probably healthier than most of us if they have survived.

Dr. Frosch. The only comment I have heard that the study is showing is that if you pay extra medical attention to a particular group of people, they stay healthy.

Senator McIntyre. Well, that is good.

Dr. Frosch. This is called the Hawthorn effect.

ENVIRONMENTAL SUPPORT

Senator McIntyre. Your exploratory development program, Environmental Support, proposes an increase of \$3.5 million over fiscal year 1970 level of \$17.1 million which is identified entirely with the project, Shipboard Ocean Environment. Will you describe this project

and explain the need for such an increase?

Dr. Frosch. This supports a number of oceanographic environmental studies connected with the whole range of oceanographic environmental factors, including underwater acoustics, reverberation effects, bottom reflectivity effects, which are related to particular sonar problems, ambient noise measurements in shallow water, optical scattering from the sea bottom, acoustic propagation in the Arctic; and things of this sort. This is an area in which we continue to need and have increasing requirements for information, because the sonar business literally lives on this kind of oceanographic information.

Note the increase from fiscal 1970 to 1971 is an attempt to restore the budgetary level that we had in 1969. We were forced to go down by budgetary pressures in 1970, and we want to restore the amount of

sustaining and support work that we are doing in this area.

Senator McIntyre. Is this program at all related to the program that was discussed the other day, which has to do with the location of

the suspended Sea Spider?

Dr. Frosch. The Sea Spider? It is related to Sea Spider in that we are using Sea Spider as a receiver to make direct sound propagation measurements. This is related in that some of the work under this has to do with the environmental measurements that will enable us to understand what the results of those propagation experiments mean.

Senator McIntyre. I notice you do not say anything about propagation when you were discussing this. This has nothing to do with

propagation?

Dr. Frosch. Well, under this item, there has been some propagation work done, but we broke out the Sea Spider as part of LRAP

because it was part of a large target identifying program.

Senator McINTYRE. The Program-Wide Management and Support budget activity includes \$9.5 million for ASW Management and Technical Support, which is \$3.4 million below the amount of the fiscal year 1970 program. Since this element provides for centralized management and technical direction for the entire ASW effort, is this reduction consistent with the importance that the Navy attaches

to that program?

Dr. Frosch. Yes, I think it is. This is an area in which there is management and support work, but also it supports a good deal of analysis program and special work for the Office of the ASW projects in CNM. I have been pretty carefully looking at the list of things that gets done under that and have been trying to shift some of the work that is being done there into some of the in-house laboratories that have the capability and should be doing it inside the Navy, rather than depending, as we have to a large extent, on outside contractors. So this is part of a purposeful effort to decrease that and use the laboratories somewhat more.

COMMITTEE PROCEDURE

Sentor McIntyre. The hour of 5:30 has come and gone. How are you, Mr. Secretary, fixed for, say, 10 o'clock tomorrow morning?

Dr. Frosch. I am sure that I can appear at the call of the com-

mittee.

Chairman STENNIS. Senator, excuse me just a minute. We are planning to have a meeting in this room at that time with a group from Appropriations and some from Foreign Relations. We can switch.

Senator MoIntyre. We can get room 224, sir.

Chairman STENNIS. All right, that is fine.

Senator McIntyre. I think that perhaps in the 50 or so other areas we would like to inquire about, we can probably reduce that down to 40 or so and see what we can get on those.

Chairman Stennis. I am pleased very much that you are going to have a meeting and hope that these gentlemen can be back all

right so that we shall get a chance at it tomorrow.

Senator McIntyre. We have not gotten into the real biggies. We have not talked about ULMS or ETC or MK-48. So we shall have those for tomorrow. And we shall finish up by noon tomorrow, I assure you, because I am New Hampshire bound.

Chairman Stennis. This is very good, very thorough. These ques-

tions and answers are excellent.

Senator McIntyre. Mr. Fine has done a remarkable job of ferreting out this information. I have tried to get these fellows to worry about \$500,000.

You fellows do not worry about \$500,000 a bit.

Dr. Frosch. We worry about them, but you bring up a lot of details.

COMMITTEE RECESS

Senator McIntyre. Well, we thank you for coming here, and we shall see you tomorrow morning at 10 in room 224.

(Whereupon, at 5:35 p.m. Thursday, March 19, the committee was recessed, to reconvene at 10 a.m., Friday, March 20.)

MILITARY PROCUREMENT FOR FISCAL YEAR 1971

FRIDAY, MARCH 20, 1970

U.S. SENATE, COMMITTEE ON ARMED SERVICES, Washington, D.C.

The Committee on Armed Services met at 10 a.m. in room 224, Old Senate Office Building, Hon. Thomas J. McIntyre presiding.

Present: Senator McIntyre.

Of the staff of the Preparedness Investigating Subcommittee: Hyman Fine, professional staff member.

DEPARTMENT OF THE NAVY

RESEARCH AND DEVELOPMENT

Senator McIntyre. Well, let us continue where we left off yesterday afternoon.

STATEMENT OF HON. ROBERT A. FROSCH, ASSISTANT SECRETARY OF THE NAVY (RESEARCH AND DEVELOPMENT); ACCOMPANIED BY REAR ADM. E. A. RUCKNER, DEPUTY CHIEF OF NAVAL OPERATIONS (DEVELOPMENT); REAR ADM. T. B. OWEN, CHIEF OF NAVAL RESEARCH; REAR ADM. T. D. DAVIES, DEPUTY CHIEF OF NAVAL MATERIAL (DEVELOPMENT); MAJ. GEN. L. METZGER, DEPUTY CHIEF OF STAFF (R.D. & S.), U.S. MARINE CORPS; AND REAR ADM. W. D. GADDIS, DIRECTOR, BUDGETS AND REPORTS, NAVCOMPT

Senator McIntyre. Mr. Secretary, a new element is proposed for fiscal year 1971, entitled "Stategic Offensive Weapon System—Management and Technical Support," for which \$3 million is requested. Aside from the ABRES support project for [deleted] million, what specific new use do you plan for the remaining [deleted] million?

Dr. Frosch. I would ask Admiral Rucker to respond to that question.

Admiral RUCKNER. This is renaming of a previous item that has been in the budget. It includes the money for the preliminary study work on the SABMIS program and several other items.

Senator McIntyre. Are you still clutching that SABMIS program

to your bosom?

Dr. Frosch. We are still looking at it in the possible system.

Senator McIntyre. That is where you take some of the old Victory ships and put a multimillion dollar installation on them and send them out to get sunk by a torpedo.

Dr. Forsch. I do not think it would be Victory ships. I think it would

have to be a new hull and suitable radar and missiles.

Senator McIntyre. A lot of passenger liners are available at pretty good prices, are they not?

No, seriously, I do not think much of that program.

Dr. Frosch. It is something we have been looking at to see whether it does make sense in an overall strategic context.

Senator McIntyre. Excuse me for interrupting. Will you now ex-

plain what you are going to do with the [deleted] million?

Dr. Frosch. This program also contains the work that the Navy will continue to do in backing up the SALT negotiations, and it will look at various ship-based concepts for ICBM other than submarine concepts. We shall look at various questions of strategic force mix, strategic force alternatives, questions of possibilities of [deleted] which might be based at sea, and so on. This is a general background to the naval portion of the Strategic Weapons System problem.

I believe Admiral Smith would like to add a few words here.

Admiral SMITH. That generally about covers the work. The major portion of this—in fact, practically all of it—will be done on contract. The amount was arrived at more by general level of past experience than adding up individual, specific study proposals.

DENTAL RESEARCH INSTITUTE

Senator McIntyre. Funds proposed for support of the Naval Dental Research Institute, Great Lakes, Illinois, show a marked increase from \$190,000 in fiscal year 1969 to \$351,000 in fiscal year 1970 and \$500,000 requested for fiscal year 1971. Will you explain?

Dr. Frosch. Senator, I am afraid I shall have to answer that for the

record. I do not know the details of that.

Senator McIntyre. All right. (The information follows:)

The Naval Dental Research Institute was established in 1967 in order to consolidate and improve the productivity of the Naval Dental Research effort. The FY 1970 increase reflected the concentration of dental research at the Institute with increased emphasis being given to combat dental support. The development of dental support capability as an integrated part of Marine Corps and Navy operating forces involved the modification of standard Marine Corps vans to handle combat dental support units. The FY 1971 funding level will provide for continued emphasis on development of amphibious warfare support capability. The pace of field testing with cavity prevention agents will also be speeded in order to reduce the number of dental casualties suffered by men on isolated assignments far from dental care facilities. Emphasis will also be placed on more efficient delivery of dental care to the Naval Shore Establishment in order to make the best use of skilled manpower in short supply. It is anticipated that the funding in years beyond FY 1971 will remain at about the same level.

SPACE SYSTEMS ACTIVITY

Senator McIntyre. A similar growth pattern is reflected for the Naval Space Systems Activity, Los Angeles, Calif., which increases from \$2.4 million in fiscal year 1969 to \$6.7 million in fiscal year 1970 and \$11.5 million requested for fiscal year 1971. Will you explain?

Dr. Frosch. That organization is the technical management connecting group for the Navy's space program efforts including the Naval [deleted] Program. The money that goes through that organization Force has increased along with the increase in the [deleted] Program. That is reflecting a project line item increase in the budget.

Senator MoINTYRE. We feel that since the increase is so significant,

we want a more specific answer for the record, at least.

Dr. Froson. Well, the point is that you are reading the budget of an organization which includes funding of the projects managed by the organization. This is the same and not separate money from the project money that is discussed under the [deleted] Program. This is only an identification of the organization through which the [deleted] Project money is spent.

Mr. Fine. Is that a measure? If it is the organization, is it a measure

of a buildup in personnel, largely?

Dr. Frosch. No, it is a measure of the amount of money they are transmitting to the contractors. It is simply an accounting note that says this year, that organization is going to have a total budget of ω million dollars, and if one looked at it in more detail, a small piece of that would be for the people there and the large bulk of it would be for the money that is further transmitted to the contractors.

Mr. Fine. But there must be some specific reason why the increase

is so marked as among the 3 years.

Dr. Frosch. That is because the program, the radar for the [deleted] Program has moved from study through the design to the construction of hardware, and it simply takes more money to build the hardware than it does to design it or study it.

Mr. Fine. The answer for the record should address specifically

what the dollars are being used for. Dr. Frosch. Yes, we can do that.

(The information follows:)

The Navy Space Systems Activity is a field activity under the management control of the Naval Air Systems Command. This organization is physically colocated with the Air Force Space and Missile Organization in Los Angeles, California. The \$11.5 million requested for FY 1971 will be distributed as follows: [Deleted.]

CONSOLIDATION OF RADAR RESEARCH PROGRAMS

Senator McIntyre. Did you ever come to the conclusion that there ought to be a separate line item called Radars? It seems to me everybody in all the Services is building radars of all types, all confrigurations, and they are always very expensive. I satisfied myself during one briefing that there was a way in which the expertise in-house was brought to bear on this so that the Navy was not developing a radar that the Army was not aware of. That is the pooling arrangement that they have.

Dr. Frosch. Well, when you use the term, "radar," you are using a term that covers the whole electromagnetic spectrum and a whole variety of different kinds of objects. It is like using a term like seeing or hearing, so that it covers a tremendous range of technology and possibilities. In a way, it is a blanket term rather than referring to a specific thing. So that is why it covers so many items.

Senator McIntyre. That is why I hear it so often.



Dr. Frosch. Yes, that is why you hear it so often, sir.

Actually, the personnel at the Navy Space Activity will go down by six between last year and this year, from 46 to 40 people, but the amount of money they will be handling will increase.

PRICING OF CERTAIN PROGRAMS UNDERSTATED

Senator McInter. Various major weapon system programs have been briefed to the Research and Development Subcommittee, and it has become apparent that the pricing has not been consistent. In some cases, fiscal year 1971 and later year requirements are priced in fiscal year 1969 dollars, while in others, provision has been made for inflation based on experience. This would result in your estimated requirements being understated for fiscal year 1971. Would you comment on this?

Dr. Frosch. This, I would take it, has reference to the Selected Acquisition Reports. This has been a problem for us from the beginning of the reports. What we are driving for, not only in the Navy Department but in the whole Department of Defense, in the SARS, is to get some uniformity, some uniform set of ground rules that everyone can agree to on how different type programs ought to be priced so that everyone, when reading a SAR, will understand in common dollars, the comparative meaning of the estimates and costs. This is under very active discussion at the present time. There have been meetings pretty constantly to try to get this settled.

I agree there has been some confusion in this area. There are some

SARs that are priced in one way, some in others.

With regard to the R.D.T. & E. program, the policy has always been to price R.D.T. & E. in current dollars; that is, the dollars in use at the time the budget is being constructed. Now, to the extent that there is inflation between that time and the time the money becomes available and is spent, we are always in tighter circumstances than we expected to be.

The alternative, presumably would be to change the policy and make it a policy of predicted inflation in some uniform way and price the budget in current dollars, translate it into dollar value expected

in 18 months, and so on.

I think that might be vulnerable to the criticism that we were making of an uncertain prediction of the future, and if the rate of inflation turned out, for example, to have been overestimated, we would then be getting more money than we should for the program. There is probably no way to do it that is completely satisfactory.

RELATED STATEMENTS OF DR. FROSCH

At this point Senator, I would like to enter into the record two addressess which I have given recently and are germane to this subject. The first, "A New Look at Systems Engineering" given at the Institute of Electrical and Electronics Engineers, Inc., on March 26, 1969. The second, an address given at the 16th Annual Institute on Government Contracts, George Washington University/Federal Bar Association, Washington, D.C., May 8, 1969.

(The information follows:)

STATEMENT BY THE HONORABLE ROBERT A. FROSCH, ASSISTANT SECRETARY OF THE NAVY (RESEARCH AND DEVELOPMENT), AT THE INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS, INC., LUNCHEON, NEW YORK CITY, 26 MARCH 1969

A NEW LOOK AT SYSTEMS ENGINEERING 1. GENERAL

Application of systems engineering to the development and fielding of useful

military systems.

I will really be talking of the application of systems engineering to development, and in particular to military systems development (which I am most familiar with). However, reading journals and newspapers, I suspect my remarks are of more general applicability. I have said some of these things before, but some bear repeating and some I hope will spark new ideas.

The system idea, solution idea, solution of a complete problem, in its full environment, by systematic assembly and matching of parts to solve the whole problem in the context of the lifetime use of the system, considering all aspects, is one of the most important ideas of modern times. It has made possible the solution of complicated problems that previously could not be touched. However, there exists a rising tide of problems and general disgruntlement (expressed by many people) that indicates trouble. Therefore, today I will speak as an "engineering critic" (intended in the sense of a music critic: are we turning in a good performance?) and I will take the negative; lots of people are taking the positive on system engineering.

I couple systems engineering, systems analysis, and Management because in practice they seem to be closely related terms, referring to the same constella-

tion of systematic practices and attiudes.

We badly lack-

Systems Engineering of Systems Engineering;

Systems Analysis of Systems Analysis.

And heaven knows there is no Management of Management.

Therefore, I will now preach against home, motherhood, and apple pie for a

To the charge that I am talking about bad systems engineering, I can only say that I am taking a pragmatic view: the thing is defined by what is done, not what is said; and if what I am describing is bad systems engineering, I can only say that I seldom see any other kind.

What I want to do is discuss briefly a series of antitheses (and perhaps an unbalanced question or two) that pit the systems would against what I believe

are some aspects of the real world.

2. CONCEPT

Progress versus time?

If I plot a graph versus time of what appears to be a recent rising tide of costs, cost overruns, unsatisfactory performance, and unhappiness among engineers, I have reason to worry. (If this trend continues, we may have to debate whether the question "whither engineering?" is spelled with one "h" or two.) If I plot on the same graph versus time the rise in talk, directives, and use of "systems engineering." "systems analysis," and "Management" (with a capital "M"), I see high correlation between the two graphs: trouble versus time and the use of systems engineering versus time. This does not prove causation, but it suggests, at least, that the "new techniques" are proving to be a poor substitute for real science and engineering: they are at least not doing what they are advertised as doing, if they are indeed not actually making things worse. It could be that things would be even worse without these new techniques, but I would like to ask some questions and suggest some reasons for believing that systems engineering, systems analysi, and Management, as practiced, are likely to be part of the problem, and indeed causative agents.

4. WHAT IS THE BASIC PROBLEM

Entranced with technique.

I believe that the fundamental difficulty is that we have all gotten so entranced with the technique that we think entirely in terms of procedures, systems, milestone charts, PERT diagrams, reliability systems, configuration management, maintainability groups, and the other minor paper tools of the "Systems Engi-

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neer" and manager. We have forgotten that someone, some person, must be in control and must exercise his management, his knowledge, and his understanding to create a system. As a result, we have developments that follow all of the rules, but merely fail.

I can describe the spirit of what I have in mind best by thinking of a music student who writes a concerto by consulting a check list of the characteristics of the concerto form, being careful to see that all of the canons of the form are observed, but having no flair for the subject; as opposed to someone who just knows roughly what a concerto is like, but has a real feeling for music. The results become obvious upon hearing them. The prescription of technique cannot be a substitute for talent and capability, but that is precisely how we have tried to use technique.

5. PAPER VERSUS PEOPLE

Abstracted commentary rather than a living guide to development.

Thus my first antithesis pits the systems world of paper and arrangement against the real world of people and hardware. When paper appears in the real world version of a system it is generally only as an abstracted commentary. For example, in a very basic sense it really is of no consequence whether the documentation on a weapons system is good, bad, or non-existent, that is only a commentary on whether or why the people and the hardware actually work when called upon, and a tool to help them work. If the systems arrangements on paper and the documentation can help to make the stuff work, then they are of some use. If they are merely the formal satisfaction of a requirement, they are only an interference with engineering. Systems, even very large systems, are not developed by the tools of systems engineering, but only by the engineers using the tools. In looking back at my experiences in development, including watching a number of Navy developments over the past few years, it seems quite clear that in most cases where a system gets into trouble a competent manager knows all about the problem and is well on his way to fixing it before his management systems ever indicate that it is about to happen.

This happens if for no other reason than because the competent manager is watching what is going on in great detail and perceives it long before it flows through the paper system. That is to say personal contact is faster than form filling and the U.S. mails. A project manager who spends his time in his Management Information Center instead of roving through the places where the work is being done is always headed for catastrophe. The MIC can be an assist to the people who are not involved in the project toward learning of after-the-fact problems, but that is roughly all that it can do, and its value even for this purpose is frequently questionable.

Blaming deficiencies in management systems for problems that exist in real unknowns, or in the deficiencies of people, is mere foolishness. In a poem called "Bagpipe Music," by Louis MacNeice, the final couplet is: "The glass is falling hour by hour, the glass will fall forever, But if you break the bloody glass, you won't hold up the weather."

6. LINEARITY VERSUS NON-LINEARITY

Problem decomposition.

One of the key mis-assumptions in modern Systems Engineering and Systems Analysis is that the total problem can, and frequently is, decomposed into subproblems, the subproblems can be solved more or less independently, and the total solution can be synthesized by combination of the subsolutions, treating the interactions of the parts as "interfaces." The real world is, however, highly non-linear, and unless real attention is paid to this fact, the linear decomposition treatment will fall catastrophically, because the interaction terms may be as large as the subproblems and not reducible to simple interfaces. The result may well remain decomposed.

This criticism is frequently answered by the comment that problems are unmanageable unless sliced up and, therefore, we use the procedure though we know it may be seriously in error. This is the case of the man who played in a poker game that he knew to be crooked, because it was the only game in town; or the drunk who looked for his ring under the street lamp even though he had lost it a block away in the dark; the light was better under the street light. I have some difficulty seeing that a bad analysis is really better than an informed judgment, especially since faith in the analysis (and/or the decomposed solution to the problem) is frequently, nay, usually, used as a substitute for seeking or

applying any judgment at all. I am often faced with a result that seems absurd, and can even produce a quick analysis that at least makes plausible that the solution is absurd, but am then given the answer, "Well, that's what the analysis

showed."

Such a situation usually indicates room for deep criticism either of the way in which the problem was divided up or of peculiarities of the assumptions which drive the problem in curious and unsuspected ways, particularly through the unsuspected (by the systems man) non-linearities of the problem. It sometimes appears that the only rational subdivision of the problem is to fractionate the blame to the point where approval is sought by default.

I would argue that careful attention to the parts of the problem that do not seem to be easily decomposable into semi-independent parts might be one very good guide to areas involving high risk, since these are likely not to be amenable to our usual rules, procedures, and technologies, and hence will probably

have to be approached rather empirically.

7. SERIAL VERSUS ITERATIVE MODELS OF DEVELOPMENT

Techniques contribute to disaster.

System Engineering techniques themselves contribute to disaster because they all are paper techniques and there are only two instead of N dimensions available. What we end up displaying are linear sequential measures of system progress. The PERT diagram and the milestone chart are excellent examples. These both essentially assume that the progress of development and design consists of doing step A, then step B, and then Step C, etc. Anyone who has ever done a development, or a design (as opposed to setting up a management system for doing so) is well aware of the fact that the real world proceeds by a kind of feed-back iterative process that looks more like a helix than like a line. That is to say, you do A, then B, then C, then you look at C and go back and change part of A again, and that causes you to fiddle with B and perhaps bring in a B prime that you bounce against C, and then go back to A and then jump to D, so that there has to be continual adjustment, going back and forth so that the system is adjusted to itself and to its end objectives as it changes and as the design or development proceeds. Because it is difficult to predict this process or to diagram it, or to predict its costs very precisely without using competent engineers, the system engineering procedures, simply ignore the iterative, feed-back, nature of the real world because the process has been degraded to clerical reporting. To a large extent this tends to constrain project managers away from doing work in the real way, towards doing it in a way that fits with their management tools. This is clearly nonsense.

As a specific example, doctrine says that one considers the "ilities," that is to say maintainability, reliability, operability, etc., from the very beginning of the process. This is a vast waste of time and effort. I do not mean that one should not think about these things at the beginning, but it is certainly ridiculous to have a complete plan for the logistics of the maintenance of an object that has no yet been designed. What we need is the plan for how we will provide for the system when designed. I have seen overruns in expenditure and unnecessary effort generated by the fact that the linear sequencing of milestones had forced development of a complete maintenance and reliability plan for what was no longer the design, and had not been the design for three months. The machinery forced everyone to grind on and on because, after all, the maintenance and reliability milestones could not be missed without disaster and fear of cancellation of the project, even though the plan being worked out had nothing whatever to do with

the hardware being designed.

In fact, the point to start serious work on configuration control, maintainability, and reliability cannot be very well preplanned, if it can be roughly preplanned, but it must be adjusted to start at the point at which the design means something and is likely to stay still long enough so that the redesign for the "ilities" will really make some sense. Judgment, not tools, is what is required.

PREDICTION VERSUS PRODUCTION

On time is more important than performance!

This brings me to a related antithesis that I describe as prediction versus production. We have come to a time when meeting certain targets seems to have become more important than producing a satisfactory system. The question is not that of the development of a system that performs well and was produced at a reasonable cost, and in a reasonable time, but rather replacement of this sensible

desire by the question, "Does the system perform as predicted, did you produce it for the cost you predicted, and on the schedule you predicted, and did you do it in the way you predicted?" Consequently, looking at what is actually happening in the development has been replaced by measuring it against a simplistic set of predicted milestones. Fulfillment of prediction has been seriously proposed as the criterion for judging system managers. It is certainly a minor criterion. Fulfillment of a need when fielded continues to be our real objective.

I know of a number of cases where the pressure on prediction has been so great that the Project Manager was forced to destroy the possibility of having a good system, because he was not allowed to adjust what he was doing to the real world; otherwise he would have been sufficiently far off prediction in one or another dimension that the project would have been cancelled. We fell between two stools: We got a system which was only approximately what we wanted and the system failed to meet the prediction. Similarly, we also have not had the sense to cancel something which met the predictions, but was no damn good.

9. A QUESTION

Predictability of the unknown.

It is curious that those of us, sophisticated as Systems Engineers, and having read history (in which no one ever seems to anticipate what really happens), knowing that the prediction time for random noise seen through a band pass filter is only about one over the bandwidth, should yet seek predictability for the processes with a wide bandwidth of unknown information. No one can predict politics or economics; few of us predict our own lives. Why then do we assume the predictability of development of the unknown?

10. ANOTHER QUESTION

Great expectations?

Should we expect development milestones to be met?

Presumably the prior probability of meeting the perfectly chosen milestone on time is distributed randomly and symmetrically about the predicted time; if the accomplishment is relatively simple, the distribution is narrow and this is called "low risk;" if the accomplishment is difficult, the distribution is wide and this is called "high risk." However, all development schedules assume success of each process. If we put trouble contingency time allowances into every task, the total contingency allowance would be unacceptably large and the development unacceptably long.

This tends to bias the true risk distribution in such a way as to move the peak to the late side. Thus, there is a tendency for the "risk distribution" to peak after the milestone. The contingency allowance should be provided in an unpopular program element "allowance for stupidity and the unforeseen." Even so, it probably would be eliminated by the efficient review process.

All I am saying is that we only assess the risk of the predictable problems and there is always a family of unpredictable problems that make things take longer; there are few (oh, happy few) cases of luck that make things take less time. We should not expect milestones to be met, and they never (or hardly ever) are, although milestones are needed to assure adequate program pressure.

This question and my trial answer suggest a signal to noise ratio approach to risk and error assessment in development models. I have not tried to carry this further; it is left an exercise for the developer.

11. SYSTEMS IN SPACE VERSUS SYSTEMS IN SPACE-TIME

Animate versus inanimate systems.

My next antithesis I would label "systems in space" versus "systems in spacetime." We talk about system design and system choice in terms of ten-year lifecycle costs, but the assumption we tend to make is that the system we are costing is a static object once it is designed and produced. In a way this is forced upon us by the accountants' formalism of dividing costs into investment and recurring costs. Any system manager who says that he is designing his system in space-time, and that he proposes to design it so as to facilitate his ability to change it during the course of the ten-year life cycle will promptly have his project removed from under him, because the doctrine says: "This is terribly uneconomical," and furthermore, it says that it is bad system design. I would simply like to note here that real world history tells us that all systems are changed frequently during their lifetime, if for no other reason than that the real requirements and environments and technologies for them change, fre-

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quently in ways that make it stupid to leave them alone. In fact, it is almost true that no military system is ever used for the precise purpose for which it is designed

Consequently, it makes sense to think about the system as something that will have a history in time and that is likely to require change, and to include some thought of this in the design. Change, strangely, is the only truly predictable attribute of the system. Perhaps I am merely going to be enshrined in the next generation of system engineering doctrine with a special group in every project organization called "changeability management." I hope not.

The question is not whether there will be changes or not, but whether the change process will be under conscious control. Does the developer know what and why, when he allows or makes a change? Pretending that no changes are allowable or desirable is merely a way of losing control of the change process.

An example of the consequences of what I mean may be provided by the following considerations. It is systems engineering doctrine that the system should be matched throughout, that is to say it is regarded as poor practice to have, for example, high reliability components matched to low reliability components since the system's reliability will really be set by the low reliability components, while its cost is likely to be set by the high reliability components. This ignores the fact that since the system will have to change in time it may be very sensible to build in high reliability components in some parts of the system, even though the technology does not provide them for other parts of the system.

During the course of the lifetime of the system there may be a high probability of bringing the low reliability parts up to an equivalent reliability to the higher reliability parts for a reasonable cost. Thus the system could be designed for great improvement in reliability from the very beginning, while if everything is matched to the lower reliability, the cost of improvement becomes gigantic, because the changes are extensive. In fact, the rule of thumb may not be good engineering at all, if the system is designed considering change with time. We should design for growth and a process of technological leapfrogging in the system.

12. OPTIMIZATION VERSUS BANDWIDTH

Requirements will change, optimization may preclude meeting the real requirement.

One of the fundamental tenets of systems engineering is that the system should be optimized to its purpose. This is dandy if the purpose is very specifically definable, and if it is very independent of scenario and enemy behavior. If these requirements are not true, and they really almost never are for any military system of any great sophistication, then optimization may merely be the definition of which catastrophe you want to undergo. My analogy is the matching of a narrow-band filter to a specific signal. This is an elegant engineering procedure, provided you can depend on the signal to stay put. If the enemy, for example, has a slight adjustment on his frequency, then optimization in the normal sense rapidly becomes nonsense. There is no sense in optimizing the system beyond the accuracy of the definition of the requirements, and I never, or almost never, see a definition of requirements with estimated error limits on them.

This particular kind of catastrophe is most often generated by the portion of systems engineering that the economists like to call systems analysis. That is to say, having chosen some scenario or problem defined in a very specific way, the system prescription follows optimization to this problem to the bitter and ridiculous end. There is a vast reluctance to look at the difficulties and the risks involved in assuming that the chosen problem is the correct problem. I will feel much better about the use of scenarios and prediction of warfare ten years ahead for system choice and optimization if I ever meet a man who can really predict a chess game, or what will happen in the stock market tomorrow. This is not to say the game should be ruled out just because the results cannot be predicted, but rather to reinforce the fact that it is a game.

There is a procedure called sensitivity analysis, but I have rarely seen it applied to the right parameters and variations. It is usually too difficult to do so. One rarely ever considers an error analysis, even when something is known about the error distributions of the input parameters.

A related problem to this is posed by the analysis of multi-purpose objects. A tremendous difficulty is generated by the fact that the costs and characteristics must be allocated to the appearance of the system in several different scenarios. Consequently, these systems must be single solutions to several system engineering requirements. Our usual way of dealing with this problem is to

bow three times in its direction and then ignore it, because it is just too hard to solve. Solving it requires solving the systems problem for all the situations in which the multipurpose system appears, then doing all the (non-linear) interaction cases. In addition, the cost allocation to the various uses must be attacked. There is simply no methodology available for really trying this and hence the problem is generally ignored. This makes many of the analyses useless, but that is generally ignored too. There is no sense in pretending to solve problems by refusing to address them realistically because they are too difficult, but we go on playing that game.

13. OBJECTS VERSUS OBJECTIVES

Idolatry.

Finally, we do not distinguish sufficiently between objects and objectives. The working tools and most of the life of system engineering is spent trying to reach an objective, the objective finally becoming an object. It is important to keep this distinction in mind. The trouble in procurement of a development is that procurement procedures are designed to buy objects, while in development there is no object until the end, only an objective, and the two are not the same kind of thing.

For example, what is a specification? A specification is an abstract set intended to describe what is to be produced, but of course it is only a portion of a total description. It is a subset of points selected from a continuous portion of an infinite multi-dimensional space. The object itself and its total future history is the only complete specification. Consequently, the idea of a "complete" specification is an absurdity, we can only produce a partial subset. In fact, it is possible (and we have all seen it happen) for an object which meets the subset of specification points to very badly miss being a sensible solution to the problem, because it departs from the required reality between the specification subset points. I hasten to add that sometimes even the object itself, without regard to its future history, is not a sufficient specification, because it does not contain the details of the techniques used to produce it. Let the specifier beware!

14. THE FUTURE

More than Motherhood, a little sin.

Having complained about all of this for half an hour, what do I propose? The only thing I know that works is to get a competent man and his assistants. make sure they understand the problem: not the specifications of the problem, not the particular scenario written down, but what is really in the minds of those who have a requirement to be solved. Then give them funds, a good choice of managerial and system engineering tools, and let them work at it with reasonably frequent conferences with those who have the requirement. In this way, the end object may become the best that both parts of the system can produce and not merely the solution to a paper problem, said solution having the best paper properties to match the previous set of paper. (Some paper is water soluble.)

As we are now behaving, we are using up our best people in filling out documentation for their superiors to read, and most of the time no one is running the store.

We have lost sight of the fact that engineering is an art, not a technique: a technique is a tool. From time to time I am briefed on the results of a systems analysis or systems engineering job in a way that prompts me to ask the question: "That's fine but is it a good system, do you like it, is it harmonious, is it an elegant solution to a real problem?" For an answer I usually get a blank stare and a facial expression that suggests I have just said something really obscene.

We must bring the sense of art and excitement back into engineering. Talent, competence and enthusiasm are qualities of people who can use tools; the lack of these characteristics usually results in people who cannot even be helped by techniques and tools. We can all do better.

ADDRESS BY THE HONORABLE ROBERT A. FROSCH, ASSISTANT SECRETARY OF THE NAVY FOR RESEARCH AND DEVELOPMENT, AT THE SIXTEENTH INSTITUTE ON GOVERNMENT CONTRACTS, GEORGE WASHINGTON UNIVERSITY/FEDERAL BAR ASSOCIATION, WASHINGTON, D.C., 8 MAY 1969

I will talk about a set of problems having to do with the procurement of research and development. Some or all of what I will say many of you may have

heard me say before, or may have read in my various papers. In particular, some of this material is drawn from a talk I gave to the DOD-Wide Procurement Pricing Conference at Hershey in October of 1967 and other material used in various talks to DOD groups since. I apologize for this re-use of material, but since the problems have not all changed, some of the comments have not changed either.

I am not a procurement individual, or a lawyer, or trained in any one of those appropriate disciplines. As a physicist and an engineer, I am in a somewhat special position which reminds me of a story that Deems Taylor tells in one of his books. The violinist Heifetz, and the pianist, Rubinstein, went to the debut of the violin prodigy Menuhin. At that time, Menuhin was a small boy who appeared on the stage in lovely black velvet shorts and proceeded to play the violin beautifully, magnificently. After a while Heifetz began to fidget in his seat and run his hand around the inside of his collar, and finally he said to Rubinstein: "It's awfully warm in here, isn't it?" Rubinstein replied: "Not for pianists."

I suppose I have become the DOD resident skeptic on the subject of procurement. I have tried to be a gadfly, in part because that is the way I feel about these problems, and in part because I think it has been very useful in most of the meetings and discussions that I have participated in to have someone present who takes the contrary view frequently. I think this has actually been somewhat useful. I will go on doing so in this talk. Please take these as my views and not necessarily either the wave of the future or the wave of the past.

Certainly everybody, both in the Department of Defense and outside of the Department of Defense, is in a state of general discomfort about procurement policy, and about whether we have really found ways to solve our problems, or whether some of the ways we thought were going to solve our problems are just generating a new class of problems. One of the difficulties with the trends in development contracting over the past few years has been that there has been a great tendency to produce fads. One kind of thing doesn't work, and so someone invents a new magic solution. All contracts are written for awhile according to the new magic solution or at least everyone is pressured to do so. After a while it becomes apparent that the new magic solution solves some problems, but it doesn't solve all problems, and perhaps it even generates some problems. Then there arises a new saviour with a new idea for another new magic solution, and the pack follows him for awhile. A kind of Pied Piper policy system.

I think this has been particularly marked in development contracting. There was, for example, a vast shift from cost type contracting to fixed price type contracting. For awhile, whether it made sense or not, every contract was supposed to be a fixed price contract. We always have trouble with the question of whether there should be competition or whether going sole course is possible. We have this trouble even in cases where it seems quite clear that competition is impossible or foolish, but we are forced to try to do so anyway. There are other examples, including CF/CD for everything, total package procurement, incentive contracting, etc. Each introduced as a grand solution; each having problems and

flaws in various situations.

Part of this trouble comes from the fact that we frequently jump into a new scheme without adequate consideration of what the problem really is with the old scheme, or what the intrinsic difficulties are in procurement for development. We tend to look for panaceas without considering whether there could be any panaceas.

What are the kinds of problems I am talking about? I will rapidly list a whole set of questions, and then I will come back to discuss various aspects of them.

What do the terms like fixed price, risk, and competition, and tight management really mean in practice? Everybody uses them all the time, but I am not always sure I know what is meant.

What really happens inside a development? What are the real processes that the people who are doing development undertake to do and actually do? Are these processes reflected in the procurement mechanisms?

What actually happens inside a competition? Whose motive in the competition is to do what? We talk about competition as if the competitors were single chess-

men-single entities with only one motivation; are they?

What kinds of risk are there, and are they transferable from one party in the negotiation to another party in the negotiations? We always act as if they are. We say: "We want to put the risk on the contractor." Can we always put the risk on the contractor?

The overriding questions are: Do the procurement techniques really help us to get what we want? And finally, does anybody really know very much about the

answers to these questions? I am inclined to say: "No, we have been rushing around doing things on faith and not really introspecting and examining enough.

Let me now turn to some of the specific problems with development. The overall comment is that when you are dealing with development, procurement is not a way of buying something. It is a way of marking arrangements to get something done. There is an important difference between the two. When we talk about buying something we mean: I have dollars which I am willing to give somebody in consideration of a defined return. He has an object or a service which we both understand completely. I give him the dollars; he gives me the object, or the service.

Essentially all procurement systems are built about the idea of purchasing an object. The prototype procurement is: you go out and buy 100,000 nuts and bolts. The rules that go with research and development procurement have lots of exceptions written in them, but they still take the attitude that the purchase of development, contracting for development, is in no major sense different than

going out and buying a piece of hardware.

There is a fundamental difference. In the development situation there is no object to purchase, there is only an objective to purchase. There is no defined piece of hardware that can be priced in the same sense as we price a manufactured object. Nevertheless, in attempting to buy development we behave as if there really was such an object. We act as if the airplane that we had put a name to and specifications on, has in fact real characteristics and a defined real price.

From an engineering point of view at the point in time at which we purchase development, there is no such object. We are only purchasing somebody's plans, somebody's objectives, somebody's proposal against a set of specifications that we think are what we want to buy. The specifications are made from a set of requirements that we think are what we want. If we actually had a definable object, definable in the sense that we could give precise description to what it was, and know that when we got it, it would work correctly and be what we wanted, then there would be no sense of entering a development project at all: we could simply go out and buy it.

The whole point of the development process is to get something that we haven't got, something that we have never seen, and something which we don't really know can be produced. Unless this is taken into account very much more explicitly in the procurement of development, we are going to go on having terrible trouble, and will have new kinds of trouble. We simply cannot unambiguously describe before the development begins, or at any point, in fact, until we

have a finally developed object, what it is we are actually buying.

One of the attempts that has been made, ostensibly to improve part of the problem, is the Concept Formulation/Contract Definition system. It can help a great deal. The Concept Formulation, if properly carried out, insists that the requirement, the object which is wanted and its required performance is explicitly defined. This has not always been the case in the past. The Contract Definition presumably tells us precisely what it is the contractor is suggesting that he deliver and what it is that we agree that he deliver. However, Contract Definition may or may not be a great deal of help, because the end product is still not an object. It is a pile of paper that says: "I think that I can build a such and such which will look like this." There is no guarantee, in fact, there is every guarantee to the contrary, that the object defined on paper as a result of the contract definition is a producible object in the sense that if you put all those properties into the object you would get what you want, and it would work. It is better than not having a precise definition, but it is still only a piece of design paper. We tend to treat the results of contract definition as if they were pieces of sensible (tangible) hardware. They are not. We need to be very careful about what it is we are buying, even with the results of the Contract Definition.

We can make improvements over just defining the development on the basis of paper. There has been a great deal of talk recently about prototypes. If the talk that says we should always build prototypes means prototype literally in the sense of a complete object, which is the output of the development, and is an example of what would be built before continuing into production, then the only thing that can be said is that sometimes the approach applies, and sometimes it is too expensive. We are unlikely to go into the prototyping business very heavily in ships, because the single item is too expensive and the total buy is generally not large enough so that it makes a great deal of sense to do so.

There is an intermediate state that we need to consider more than we have. That is what scientists and engineers call breadboards and brassboards. This is the construction of pieces of the actual hardware that you have in mind. You try to identify those things in the proposal that make you most uncomfortable, that you are most skeptical about the performance of, and insist that those be constructed and demonstrated in hardware before you proceed beyond a certain point. It is possible to do this. There is, however, a class of system problems that do not get solved by partial breadboards.

There are real judgmental problems in whether you should agree to do it on the basis of paper, whether you have to have the complete object, or whether you have to have something in between. These technical choices have very strong implications for the kinds of choices to be made among contractual instruments; the uncertainties that are involved are very different depending on which you

choose to do.

We depend on specifications. There are several troubles with specifications. In the first place, the specification is not of something that has ever been built, that is known to be a self-consistent description of something that can be built, but only a specification of what we think, and what the prospective contractor thinks can be built. This is a built-in and automatic portion of the problem. The specifications can perfectly well be wrong in the sense that they may not be self-consistent; there may not be the possibility of an object that corresponds to that set of specifications.

The second problem with specifications is that, at best, they are a sampling of numbers that describe certain properties of the object or the system that we would like to end up with. A specification is not a complete description. It would be impossible to write a complete description, without having the object completely available, or fully developed and finally designed. We only have a selection, a few points, from a very complicated description of an object. Specifications are bound to be incomplete. They must be incomplete. There is no way

to write a complete set.

Frequently, there is an attempt to make a specification more precise, more complete, more detailed. This can result in the ludicrous consequence that we have specifications that can never be tested in detail, or at least not tested in an economic way, in the time frame that it is necessary to do so to decide whether the contract has been met. This is particularly true if we placed very detailed and very precise specifications on properties.

If we want to know whether an object or a weapon meets a certain error of probability of delivery or of reliability and if we specify the number very precisely, then the number of weapons that we would have to deliver or test in order to find out whether that specification has been met is likely to be so large that nobody wants to pay for that many test weapons or for the tests themselves. It is not unusual to see specifications which can define a test which, in the final result, would require a drop of a thousand units. Usually nobody is going to buy a thousand test drops merely for the purpose of finding out whether the contract is met.

Inevitably, we then have an argument over whether the specification was or was not met. Thus frequently, the requirement against which we are buying is missing a crucial element: can we ever find out whether the contract was in fact fulfilled?

This problem is clearly less the fault of any one in the procurement community than the fault of people in the development community: we have not always been explicit enough about what it was we meant by specifications.

We lay a great deal of stress on predicting performance and cost before we start. In fact we like to write contracts that by their strong nature imply that we have made correct predictions of cost and performance. In any development worthy of the term there are unknowns. There are things we just do not know at the beginning of the development. There are two classes of these, neatly divided up by a panel of the Aerospace Industries Association that looked at this problem a year or so ago. There are what might be called the known unknowns. We may look at the design and say: "We really don't know much about how to build this detail or that: we have certain technology and certain knowledge and we are pretty sure that we can build it, but right now, we cannot tell you exactly what numbers go into it." That is a known unknown and we can usually assess the risk; the concept is either close to something we have done before or it is not.

Much more difficult are the unknown unknowns. These include the things that you think you know, but do not really know when you start; engineering facts

that turn out to be different from the state of the art expectation than they were thought to be. There are things that are discovered during a development which are impossible to predict and impossible to write into the procurement machinery.

Now, how does a development actually go? If you look at most of our management machinery, you can rapidly come to the conclusion that a development goes in a sequential manner. That is to say, the milestone charts and the part charts and so on all say you do job A (perhaps in parallel with job B and job C) and then you carefully do job D, and when you are through with job D satisfactorily, you go on to E and so on. In actual fact I have never been associated with a development that worked that way. The process is much more complicated because of the unknowns, and because of the fact that even small things that turn out a little differently than you thought they would at the beginning can have large effects on other parts of the process. What really happens is that you do an A, B. and C and then you come to do D, and you can not quite do it the way you thought. and that means you should really go back and redesign item B. Then you look at E again, and the new E has some implication for what you did with D, and another impliction for what you had done with B, so you change those a little bit and go on. So that rather than being a straight-line sequence of jobs, it is much more like a coiled spring, that is you go around the loop of all these jobs and you do them to a certain extent, and then you discover that they have implications for each other that mean you have to do some fiddling with the results of what you did before. Rather than proceeding in a fine sequential way, at times you are doing a large part of the job all at once and then connecting all the pieces back together again. In particular, if you get into trouble with a crucial piece later in the process, you may have to go back and change quite a lot that was done early in the process.

Of course, if you haven't recognized this possibility in trying to set up the business machinery, if you've left out of the process the possibility of this iteration and reiteration, you may have chaos, and a real overrun problem. I am only saying that the development process is less certain and less definite than the way in which we frequently describe it.

It seems clear that we need to understand rather more than we do now about what really happens in development and why it happens. I know of almost no real study of actual case histories in development that goes back to find out what the engineering problems were, where they came from, and what the effect of the procurement modalities chosen were on the course of the engineering.

Almost all development projects proceed by a process of iteration in which we take the initial design (which is usually what was written down in the proposal, and may have been written down in the contract) and start to build. Inevitably in the course of building we discover that we really cannot do some of the things that we thought we could. At this point we could get into a long discussion of whether this is a responsibility of the contractor, or whether it is the responsibility of the government as the specifier and acceptor of what the contractor said he could do, or whose problem it really is. In fact, the problem is not necessarily caused by either party it is built into the facts of life into the unknowns. It is built into our ignorance of nature that there are going to have to be adjustments and iterations. The first design will be wrong; it will have to be changed in ways that we think will make the second design right; the second design will have to be changed again. The real question is not whether we can predict the design, but whether we can find a process for getting to a final object that converges to a solution in a reasonable way, and in a reasonable number of steps. By which I mean that the subsequent changes and iterations get to be smaller and smaller, until we do not bother about making any more changes.

The idea of taking the initial proposal document, actually building the system that way, and having it come out correctly the first time, is, as a matter of engineering and scientific experience, absurd. There is almost no development of any system beyond the level of the trivial that we can expect this to happen for, much less a system as complex as an aircraft, or a whole communication system. We can go back to a single machined object, and that we can probably buy, but as soon as we get to any level of complexity, it is going to have to be designed and redesigned, and built and rebuilt. Until we begin to recognize this fact explicitly in the way in which we buy development, we are going to go on having trouble with changes, because we regard changes in this procurement process as somehow an exception: the ideal process would not have any changes in it. Consequently, the mechanisms for dealing with changes are complex.

The contracts really read as if there should be no changes; the pricing system is based on the fact that there will be no changes. It is always a terrible shock that there are changes, and that change costs money. Of course there are changes. There will never be a development of a complex system without changes. That is simply part of a development process. We have to find ways to recognize that

fact, and to keep reasonable control over the consequences.

I mentioned earlier the problem of risk and transferability of risks. We often talk about writing a contract that makes the contractor take the risk. We can certainly do that with an economic risk, provided we have the nerve to follow the contract through if the contractor gets into trouble. However, there is clearly one risk that we in the Government cannot transfer and that we frequently get into trouble with. We cannot transfer to the contractor our responsibility for the national defense. If we must have a weapon or system on a particular schedule, there is no way in which we can give that absolute responsibility for defense to the contractor. We can give him the economic burden of that responsibility, but if he does not perform, and we do not get the system, and there are serious consequences for the United States and its defense, there is no way in which we can point to the contractor and say: "He goofed. I'm sorry, the country goes down the drain." That is our responsibility in the Government, and somehow we have to keep that responsibility and make sure that we can really carry it out. This is one of the things that give us trouble. For example, we contract with somebody to do a piece of a job, to deliver an item that becomes GFE to some other larger job, and he does not perform. We do not get the piece of GFE on time and so the larger project into which it fits is in serious trouble, and the larger project may be a terrible problem for us. It could be and has been a class of ships or a collection of airplanes. Then we really are in the soup. We cannot transfer that responsibility. When we have talked about transferring risk, we have frequently forgotten that there is this prospect at the end of some procurement roads. If the contractor fails, it is not an economic failure only, but it may be a very serious failure in getting a weapons system together on time. Further, the reaction back on the government's economic picture may be just tremendous because of the rest of the procurement, the large thing into which the GFE fits. Insisting that a contractor accept a risk at the twenty million dollar level and enforcing it in such a way that we do not help him to perform and he ends up failing, may sound like a fine way to take care of the taxpayers' money at the twenty million dollar level, but it may be a catastrophe for another part of the program in which we are trying to take care of the taxpayers' money and the two hundred million dollar level, where the missing piece of GFE fits. We must find some ways to consider these larger scale problems in dealing with individual

What happens inside of a competition? As I said earlier, we tend to treat competitors as if they were individual people with no motivations except competing. Of course, corporations are not individual people, except as a legal fiction. They are a large collection of people with different motives. This is an area in which I do not know very much. I have never been inside a large corporation, so I am really guessing. However, I have tried my guesses out on a number of people in large corporations, and I get amused smiles, nods, and general assent.

What are some of the motivations? The President of the Corporation really wants profit per share of stock, and so he is competing to get a job which will enable him to get that profit per share. We really have a competitive lever on the

President. He needs the profitable work in the corporation.

What is the Marketing Manager's problem? Well he is not as concerned with the profit per share or the success of the jobs he has already gotten into the company; he wants the next job. He is not competing for a chance to do a successful job; he is just competing for a chance to do the job. He wants to get that work in and get it on the record that he, as Marketing Manager, got the Company ω million dollars worth of business last year. He has a more restricted problem than the President. He also may want to demonstrate to his other customers that he has more customers. He is a little restrained in all this because it is hard for him to market unless he has some satisfied customers. However, there are cases of successful marketing that we have all seen which succeeded in spite of the fact that the rest of the customers were not so happy.

What does the Vice President for Engineering want to do? He is very likely to be interested in turning out a real quality job. It may be that in the structure of the Company, he is much more interested in the quality of the job than in the cost that it takes to do that job. His personal reputation really rests on the quality

and the performance. He sees the sales posture of the Company as involved in the question of whether the customer really likes the weapons sys em, in part because the people he deals with in the Government are concerned a out that.

The controller is obviously interested in minimizing the cost, certainly making no loss, and if possible, doing a decent job on it. He is mainly worried about the dollar side.

The Project Manager may be worried about all sorts of different things. For example, if the bawling out that he took from the Vice President for Engineering on the last job he did was because he wasn't getting his work done on time, he may be more interested in turning it out on time, possibly by cutting a few corners here or there, than in worrying about either hitting the cost precisely or getting the best quality job done.

The Bench Engineer may be worrying about whether the particular job he is doing on a component is going to turn into a good paper for the next issue of the proceedings of the Institute of Electrical and Electronic Engineers, so he may only be interested in doing an elegant engineering job on this component, regardless of time or cost.

The Shop Foreman probably wants productivity. He gets yelled at if he does not turn the stuff out. The technician on the bench in the shop may really feel that what the boss wants is for him to turn out work. After all, the work he turns out that is defective never comes back to his bench; it comes back to some other bench in the shop where the guy who fixes mistakes works.

The Value Engineer is motivated only by getting as many cost dollars out of the

project as he possibly can.

When you say competition makes the Company really work at it, that is fine, and it is true, but I am a little concerned about what it is that makes them work at. The problem of tieing company motivations together internally must be a real problem!

When competition is in the early stages of CD, it is competition to get the job; it is clearly not competition to get the best product that motivates anybody; it is competition to get the job assigned to the Company that motivates them; and that may lead to quite different results.

In light of all of the above uncertainties in the development, and problems with competition, what is the meaning of a contract? I am not sure I know. It has sometimes seemed to me as bad as if you take the contract out of the vault and breathe hard on it you have broken it, at least as far as accusations against the Government are concerned.

I will now make some comments on types of contracts. I will talk about these without distinguishing between the various kinds of fee or incentive arrangement. That is a separate issue. The two major classes of contracts are cost type and fixed price type. The cost type has one good advantage for development: it is flexible. We buy precisely what we are willing to pay for. It is the kind of contract in which the Government can control everything every step of the way. If it does not like what is being done, it can say: "Stop that and do something else."

The trouble with cost contracts, of course, is exactly the same as their advantage. Since they require government control, the Government has to exert the control. The sourest series of things that have happened in cost type contracts have occurred when we have either been unwilling or unable to exert the kind of detailed management control on cost type contracts that is required. If we sit in the driver's seat, certainly as far as allowability of cost, then we really better be driving every minute of the way. Ten years ago we apparently did not have the management ideas or the management will to control cost type contracts, except in a few special cases, and cost contracts got a bad reputation, frequently because they *vocre* bad; costs and changes were not under any control. One thing that has happened over the past decade is that we have invented management schemes and information systems that I think would make it possible for us to control this kind of contract.

Whether we have collectively and individually the will to do so on the technical side, among the engineers who like to see really nice things built, and on the military requirements side, in which people want the very best weapon. I do not know. In principle we could control it. We can put the discipline on the man who is in the government and who in fact can control every single engineering step of the way. If we don't want to buy changes, if we think it is unnecessary, if we think it is too costly, we can say no. It is perfectly true that we have failed for years and years to manage to ever say no. That is the reason I think the cost type contract has gotten into bad odor, not because it is intrinsically

bad, and not because it doesn't fit the facts of development better than the other type of contract, but because we have not been able to introduce sufficient internal discipline to make it work the way I think it is really designed to work. The question is, do we put the discipline on ourselves, whom we presume we really can control, or do we put the discipline on somebody else whom we in fact can't control, except by second order mechanisms. For a number of years in Navy development we have used cost contracts that have worked this way properly. There are also plenty of examples where they haven't, and have gotten wildly out of control with resulting trouble for everybody.

The fixed price contract is inflexible in the sense that I just described. Too much is prescribed in the contract: too much about cost, no matter what the incentive situation is, too much about specifications, too much about details, to make it easy to adjust to necessary change. On the other hand, it has the great virtue, that so much is specified, that we should have some real idea of what the job is going to cost. It puts a lot of economic pressure on the contractor's work: the cost type of contract does not really put very much pressure on him. Each has an advantage and disadvantage and I think we must choose between cost and fixed price by depending on what we think the risk of the

development is.

The fixed price contract is the most primitive contract there is: one man has an object and a price, and another man has money, and they agree that the man with the money will buy the object for the price. That is as simple a contract as you can have. It is a contract that works perfectly when the man with the object has it in hand, and the man with the money has the money in hand, and they trade. However, as soon as we get into a development situation, in which there is no object but only a goal, then there is no object that can be handed over for the fixed price. The result is that the whole philosophy upon which the fixed price contract is constructed collapses right at the start because there is nothing to buy. There is no object that can be purchased. There is only some place you would like to buy your way to buy a series of steps costing a reasonable amount of money. If we start out neglecting these possibilities, we are likely to be in for trouble, and we frequently are.

Now I come to incentives. Do we really know what it is we are incentivizing when we write an incentive. Incentives are statements to the contractor that say that if you are a good boy and do well on the difficult parts you get more money, and if you do badly you get less money, and in the end you may in fact lose your

shirt (depending on how the contract is constructed).

The thing that worries me about incentives is that we are assuming that incentives are identical to motivation, and that in fact by adjusting the dollar values of incentives we have very fine control over the motivations of the people who are actually doing the job. I don't know of any direct experimental evidence that suggests that this is really right and I doubt it. It is almost certainly not right down to the level of fine control. I think we ought to find out more about it. I think it would be very useful to try and find out exactly what the effects of certain incentives are, not on the overall performance of the contract, but on what actually happens inside the manufacturer. The probable effect of incentives on the manufacturing company is to give it a rather more complicated framework inside which it can optimize its problems. If we are not very careful about putting in the incentives, the manufacturer may well be motivated to do the wrong thing. He wants to operate in the incentive structure to maximize profit. We want him to operate in the incentive structure to produce an object which is most like our desires. The two are not necessarily the same thing.

I think that if I were a manufacturer and had an incentive type contract I would fit the structure of that contract very carefully into a computer program. I would run a computation that optimized the projected profit, and/or minimized the probable risk of loss, and every time an engineer came to me with a suggestion for doing something because of this incentive or that incentive, I would put the proposal into the program and find out what, in fact, became of my predicted profit. We ought to run a few experiments on computers to find out whether our present incentive structures really are being constructed for the

right results.

Let me give you a glaring example. In a contract that goes into cost-sharing to the point where the contractor can lose money, if he discovers that he is in the hole by more than a certain amount, the incentives all become disincentives. We have occasionally seen a situation in which I think it is fair to say that at some point the contractor's best move definitely was to get himself

put into default and never deliver. The Government can find itself in a very difficult position since it may want the end object very, very badly. At such a point the incentives can tell the contractor the thing he better do is get out, and our government situation may be such that we cannot really afford to let the contractor get out. We can find ourselves in one of those wrestling situations where we are just about to break each other's leg, and neither one of us knows how to let go. This can be a suicide pact contract.

Award fees strike me as substituting judgment where incentives use measurement of specific items. On the whole I think judgment is likely to be better than complicated incentive schemes, because it is much easier to decide after the fact, or after a portion of the fact, that something was well done or badly done, than it is going to be to anticipate precisely the proper detailed incentive structure

for a development with possible unknowns.

Are there other possible combinations? Does it make any sense to think about fixed price contracts with award fees, for example? Does it make any sense to talk about cost type contracts that nevertheless have a ceiling, or even a cost type contract that has a ceiling and a target. It is clear to me how you enforce that on the contractor; I don't understand quite how we enforce it on ourselves in the Government. Nevertheless, these schemes might have some advantages.

Now I will touch on total package procurement, and the transition from development to production. In total package procurement, when we tie development and production together and put all the responsibility on the contractor, the problem is whether we can make good enough predictions early enough in the development cycle so that we can really say something intelligent about what production is going to be like, and what the various ceilings and targets and incentives should be like for production. If this cannot be sufficiently well done, then it may be very difficult to have a real total package procurement without undue risk. Sometimes it is much better to wait until a lot of development is done before we discuss any procurement possibilities at all.

One of the real problems is that we have tended to think about development and production as though development ended and production started on a given date. That is not correct. Early production is a continuation of development. We may call it production, but the first time a man tries to build things at a high rate on a production line, things that he has been hand tooling or building at a slow rate in development, he faces a new class of problems. Many weapons which have been built in some kind of hand tooled prototype actually have to be redesigned to some extent to go onto production machinery. When you do this you are doing a redesign that frequently amounts to a minor amount of redevelopment.

If you assume that this minor amount is zero, then there is a good chance of having trouble on the production line. When you have a tight production contract and a schedule and everybody is all tied up with the usual clauses, there may be real trouble. We must think about the transition from development to production, and then to full production, in some way that makes it a long splice instead of a butt weld. One idea for doing this is to have a development phase, then a first production which is a prototype production transition phase on the production line, and then a high rate production phase. We could think about changing the type of contract instrument as we go from phase to phase to reflect the different degree of certainty that we would have about what we are doing. Perhaps we should include clauses that allow for some redevelopment during the transition phase. Another idea is to write the first production contract as two contracts. A fixed price contract for production, and a controllable (perhaps cost type) contract which allows the government and contractor to agree on certain development work which feeds back into the production contract to take care of unexpected early production problems.

Now the latest scheme that we will be trying to help smooth the transition from development to production is what may be called non-calendar connection of production to development. What this is intended to cure (and may cure) is the problem that arises when we write a total package contract, and the end of development is symbolized by a calendar date, which is the date production starts or is authorized. If we arrive at a certain point in the development and say it is not far enough along, the contractor has not demonstrated the product, we are likely to be faced with the contractor saying: "If you don't sign a production contract on such and such a day, then the ceilings and targets that we negotiated last year do not hold." Then we know we will have to pay more, and there is a lot of pressure to start production to save the competitively arrived at price, even though we may not be quite happy about the state of the develop-

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ment. The proposal now is to change that by agreeing that the initiation of production or go-ahead for production occurs after some benchmark of demonstration has been passed in development. It will help with that problem by removing the pressure of the calendar. However does it remove too much pressure from the calendar? There will possibly be a tendency on the contractor's part to say to himself: "If I can force the Government into slipping the production date because of this problem A that he knows about, I may buy myself six weeks to solve problem B that we just discovered and that he does not know about yet, and I may decrease my risk of loss that way." There will sometimes be pressure inside the government to say: "If we only had six weeks more testing we would be that much surer of success, or with another two months we might have a chance to get this other little idea for improvement tried out." While it is fine to put a sliding spline into the contract, there may be some problems with this new scheme that will take very careful watching on our part until we understand how this really is going to work.

While I have said a lot of fairly detailed and specific things in a short time, I hope that it all adds up to a message that says: "Development inherently involves risk and change and these must be considered in procuring development." I view procurement and contracting for development as an area in which we need as much development innovation and idea generation and careful thought as we do in the development of the hardware itself. We have not solved all of our problems, and some of the solutions to some of our older problems have generated new problems. I think this is an area which really needs a

great deal of professional examination and thought.

MK-48 PROGRAM PROGRESS

Senator McIntyre. The other day we were briefed on the MK-48 Torpedo. We were advised that the program was proceeding satisfactorily and that presently there are no major technical problems, although operational evaluation testing is yet to be accomplished.

Are you satisfied with the progress of this program?

Dr. Frosch. Yes, I am, now. The other day, I read the detailed document, the technical document prepared by ORL at Penn State that went through all of the details of the testing on the basis of which it was their technical conclusion and recommendation that the torpedo was ready for production. It has been through a very extensive test matrix on an instrumented range, and it has performed all of the functions of the torpedo, has met the specific indications, with two exceptions.

One exception is that there is still some problem with the [deleted] system. You understand that these torpedoes are designed [deleted] and puts in recording equipment so one can understand the test through analysis of the data.

This torpedo is [deleted].

The other way in which the torpedo has not met specific indications is that the [deleted]—that is, the [deleted] is higher than the original specification. It is not higher than any previous torpedo; it is the same or a little lower. And it is of a level which we feel does not prejudice the performance of the torpedo and does not affect the internal performance specifications; that is [deleted] range of the torpedo, and so on.

We now believe that there is some question as to whether we have the technology to build the torpedo [deleted] originally specified. But we are satisfied that that will not be a problem with the torpedo.

I think the next thing that we need to face is the question of the producability of the torpedo on a production line so that it comes out to be a reliable and maintainable torpedo, and the question of the

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production cost of the torpedo and what action we can take to bring that down.

Senator McIntyre. It was my undstanding when I was down at

AUTEK that they had [deleted].

Dr. Frosch. I have just gotten a note that corrects me. I was thinking of the Keyport Range. There was one torpedo [deleted] several months ago. I have and can give now or put in the record detailed statistics on the test runs.

Senator McIntyre. I think that would be good. There have been

considerable test runs, have there not?

Dr. Frosch. Yes, there have been since the 1st of February, 1969, on the MK-48-0, there have been [deleted] runs in testing, and [deleted] out of, I guess, the last [deleted] attempts to make a run to test all or a portion of the system were successful, which gives us what we might call at this point about an [deleted] percent expectation of material reliability. I do not think that this can yet be translated into an overall weapon reliability figure. There needs to be somewhat more testing for that. But it is in that range of success.

(The information follows:)

QUANTITATIVE TESTING IN WATER

The MK 48-0 has had a total of [deleted] runs [deleted]. Of the last [deleted] runs the engine performance was [deleted] reliable and the unit carried out the ordered program on [deleted] of the runs.

The MK 48-1 has had a total of [deleted] runs [deleted]. Recent DPT test-

ing has shown a greater than [deleted] reliability.

TORPEDO PROGRAM COSTS

Senator McIntyre. Your total estimated program cost for the MK-48 torpedo has increased from \$752.3 million to \$3 billion, an increase

of about 400 percent. Would you care to comment on this?

Dr. Frosch. Yes, there are several comments that need to be made. I think the first comment to be made is that inherently, the prediction of the production cost of a weapon at a time before one has gone to a contract for the development of a weapon, which is the time frame for that original prediction, and before the corporation that is going to do the design and the development and the construction of the torpedo has ever started to put pencil to paper, really to do a detailed design, is an inherently risky and difficult business.

We try continually to improve our means for estimation, but they

are not very good.

This torpedo is the most complex and highly performing torpedo that we have ever built, and we think that anyone has ever built. The original estimate was made by looking at the previous most complicated torpedo, the MK 46, which is [deleted] the size and much simpler in operation, trying to scale up that estimate in terms of the increased complexity and size of the torpedo and make a production estimate.

So I think that is one inherent difficulty.

Second, as is quite well known, there were real development problems with this torpedo, some, I think stemming from the performance of the contractor and some perhaps after the contractor had squared himself away, stemming from real technical difficulties in the torpedo. This extended the time for development; it put us in a position where to regain our confidence that the development could be completed satisfactorily, we added a good deal to the program. To do this contracted, aside from Westinghouse, with other contractors to produce [deleted] for the warhead, to provide additional analysis and study work to help Westinghouse. We did more in-house work than we had expected.

This and the extension of time increased the cost of the development

itself.

One factor that has to be added to the original estimate is, our estimate of inflation between the original date of that estimate and the

current estimates, and I do not know what figure——

Senator McIntyre. What was the original date of that estimate? Dr. Frosch. The original date of the estimate was some time in 1963, so there is 7 years' worth of inflation that has to be looked at, and I do not know what one would like to compound inflation at in this kind of subject. It is probably at least 5 or 6 percent a year. So there is at least an additional, I guess it is 40 percent or so, compounded.

That, of course, does not explain a difference of a factor of 3 or 4.

Now, there are other additional complications that can be seen if you look at the SAR. Two things. The first, at the time we began to design this torpedo system, we were developing a target, a torpedo target, which we expected to develop and put into the fleet for fleet exercises. [Deleted.]

Now, the program, which was entirely separate from the MK-48, which was intended to produce the exercise target in the flight, was later canceled. It got into difficulty. It then became necessary to use the MK 27 target, which was developed along with the MK 48, originally intended only for the preflect exercise target use to bring that

in as a target for the fleet.

The purchase of those targets automatically becomes part of the MK 48 porgram, and so suddenly, in the cost to complete column of the SAR, one sees a requirement for a number of MK 27's, and this adds a \$380-and-something-million item to the current program, which

was never expected in the original program.

There is a similar comment to be made about the dual-purpose nature of the torpedo. Here I cannot give precise numbers for what the effect was. But originally, when the MK 48 was to be only an antisubmarine torpedo, we had a separate program for a separate torpedo for submarines to be used as an antisurface ship torpedo. At the time the MK 48 program was clearly in trouble, and we had a program in Clevite, it became clear that it might be possible with relatively small changes to the basic torpedo to make a weapon that was capable of dual-purpose operation against submarines as well as surface ships.

The operators in the fleet were extremely eager to do this, because it simplifies the submarine commander's tactical situation to have only one kind of torpedo which can be used for either purpose, because then he can load his launch tubes knowing that whatever target turns up, whether surface ship or submarine, he is ready to fire. If he has two kinds of torpedoes, he has to make an early estimate of whether he wants to be prepared to fire against submarines or surface ships and load his tubes accordingly. He can then be in the embarrassing

and annoying situation that he comes across a set of targets that he has not anticipated in the loading of his tubes. He has to unload his tubes and reload them then.

So the fleet is eager for this dual capability. So we canceled our surface ship program and made the MK 48 a dual-purpose program.

The reason I cannot put numbers on this is I do not think we ever had a full production estimate of what it would have cost to go ahead with the antisurface ship torpedo and, in some sense, what cancellation charges and savings should be to the credit the MK 48 for the increase in price. But it is impossible to put these kinds of numbers on.

RECENT INCREASES IN PROGRAM

Senator McIntyre. At that same briefing we were advised that the fiscal year 1970 R.D.T. & E. program for the MK 48 is short \$4 million which will be covered by a formal reprograming action. We were also advised that the \$36.3 million requested for fiscal year 1971 is short by \$7.5 million. What has happened in less than 3 months since the budget was submitted to justify these increases and how can we be assured that substantial additional increases will not occur?

Now, Mr. Secretary, we have to try to make our answers a little briefer, and where you do feel—and I think your answer on the MK 48 just given is important—perhaps we had best try to hit the high spots in an answer and then furnish for the record any further information, because Iwant to stop at 12 o'clock.

Dr. Frosch. I think this question it would be better to answer for the record. I do not have the details in my mind, and it would be easier to dig them out later.

Senator McIntyre. Very well. (The information follows:)

The additional FY 1970 funding covered the continuation of the Mod 2 development (2.2M) which had been deferred until satisfactory performance of the MOD 0, and covered MOD 1 documentation, training, and testing costs (1.7M) which were underestimated.

(1.7M) which were underestimated.

The additional FY 1971 funding restored the project to the 1969 approved FYDP profile which had unfortunately been reduced by 20M in the DOD budgeting cycle on the assumption that the Navy could make a decision between the competitors in FY 1970. The budget submit of 36.3M was known to be short when submitted but the best sources could not be ascertained until the current apportionment cycle.

OTHER PROGRAMS WITH ELEMENT CHANGES

Senator McIntyre. If this situation is not unique to the MK-48, could you identify for the record all other program element changes where the amounts requested for fiscal year 1971 require change? Will you include explanations in each case?

Dr. Frosch. Yes.

(The information follows:)

Senator, at this point in time, I regret that I cannot give you a definitive answer for the following reasons:

a) The Navy is about midway in its review of the FY 1971 budget apportionment submission.

b) Like the MK 48 program manager, every other Navy RDT&E program manager is reviewing his progress, milestone schedule, and funding status since the submission of the Navy budget to OSD last December. As you are no

doubt aware, a six-months time span normally occures between the budget submit and apportionment; and during this period, program changes do occur, priorities among programs shift due to unexpected delays caused by problems in technology, or, conversely, we have successes which support a speed up in effort.

c) Some programs which we would have liked to fund at a high level last December, but could not, will again be examined for possible modest increases if the priority of their effort warrants and sufficient funds in lower priority programs can be found to offset the increases.

d) A major factor in our planning for apportionment will be the FY 1971 Authorization Bill and the resultant actions we must take to conform to its

content.

For these reasons, I am unable now to provide details on what programs will be increased or decreased; but, in keeping with the desires of various Congressional Committees stated during the FY 1970 Defense Appropriation hearings, the number of adjustments in our FY 1971 apportionment will be kept to an absolute minimum.

PREPARED QUESTIONS FROM SENATOR STENNIS

Question. There have been serious problems in the development of the MARK-48 Mod -0. Have there been developmental problems of equal magnitude in the MARK-48 Mod-1 program? If not, what is the reason?

Answer. There have not as yet been problems in the Mod 1 program of equal magnitude to those who found in the Mod 0 program. Some of this is no doubt due to the fact that the Mod 1 contractor had the benefit of more recent experience in designing a modern torpedo guidance system because this contractor had been engaged in this effort under an advanced development program. However, the Mod 1 is not yet as far along in its tests as is the Mod 0 and we are watching carefully the current pre-PPT test program for any signs of a serious problem. So far none have turned out to be major.

Question. From an engineering, design and operational standpoint, which is superior, the MARK-48 Mod-0/2 or the Mod-1?

Answer. I think that we cannot, at this time, answer that question with real confidence. Each torpedo appears to have certain advantages and disadvantages relative to the other, but additional tests are required to validate them and to enable us to answer this question. The Navy's test and evaluation force (OPTEVFOR) will evaluate these weapons against their specification and provide us with the fleet's views on this issue. The overall decision will have many factors influencing it, including torpedo performance, maintenance and turnaround capabilities for re-use after exercise use, reliability, costs, etc.

Question. Is there any difference in the capability to resist enemy countermeasures and, if so, which is superior, the Mod-1 or the Mod-0/2?

Answer. This feature too will receive evaluation as part of the Navy's operational evaluation. Testing to date does not indicate which unit is superior.

Question. The Mod-1 is designed as a dual purpose anti-ship and anti-submarine torpedo. What major design requirements have been or will be necessary to convert the Mod-0 into the Mod-2 which will make it a dual purpose torpedo?

Answer. The major modifications are: (deleted).

Question. Are there any major parts or subsystems which are common in the MARK-48 Mod-0 and Nod-1 and, if so, what are they?

Answer. (Deleted.)

Question. Will the test and evaluation of the 65 Mod-0 prototypes and the 40 Mod-1 prototypes be adequate to make a decision on which torpedo to buy for the fleet? If so, why does the Navy schedule call for procurement of an additional (deleted) Mod-0 torpedoes and (deleted) Mod-1 torpedoes prior to selecting one torpedo for the fleet?

Answer. Yes, the test and evaluation of the stated numbers of production prototypes will meet the minimum requirements to make the decision as to testing. Integral parts of the decision on the ultimate model to be selected are the capability of the contractor to produce and the cost of production. These factors

will be determined through the additional production quantities. Additionally there is a requirement to maintain the contractor production lines in minimum operation at the minimum level (which these buys represent) so as to be able to start immediate full scale build up on the chosen model. A side benefit of these buys will be the continuing cost competition. Of course the *primary* reason for purchasing these torpedos is to fill an urgent fleet need.

Question. The Operational Evaluation of Mod-0 prototypes started in February, 1969, and the Operational Evaluation of the Mod-1 is scheduled to start [deleted]. Based on this schedule can the Navy make a decision as to which torpedo it should procure with FY 1970 and 1971 funds in lieu of purchasing additional quantities of both torpedoes for testing prior to making a decision?

Answer. No, sir, the buys are not for testing but as indicated above are to keep production lines open and start the fleet build up while testing to complete the decision. These buys are production warshot torpedoes for the fleet—not for testing.

Question. If the Navy procures (deleted) additional Mod-0 torpedoes, will they be used for testing or will they be deployed operational to meet the Soviet threat?

Answer. They will be deployed operationally for fleet use in training and to meet the threat.

Question. Can the same electronic test and handling equipment be used for both torpedoes? What is the cost for a "set" of this necessary support equipment?

Answer. The same test equipment can be used only in the common areas (deleted). Most of the handling equipment is the same, however. The majority of the electronic test equipment is not interchangeable and the price of a "set" is about 500 thousand dollars. The price of the handling equipment is negligible.

Question. How much of this test and handling equipment is necessary to support the initial limited procurement of Mod-0 torpedoes prior to making a choice between either the Mod-0 or Mod-11 Could this equipment be converted for uxe with either torpedo or will it become obsolete if the Mod-0 is not selected to be the fleet torpedo?

Answer. No additional test and handling equipment will be purchased to support the initial limited production of Mod 0 torpedoes. The units already purchased for testing will be refurbished and used to support the service lines in the fleet. There is a slight possibility that some of the test equipment might be convertible to the Mod 1 if that weapon should be selected. In any case it will be used to service the Mod 0 in the fleet until those units are expended (deleted).

Question. What is the estimated unit cost of the limited procurement of the first (deleted) production torpedoes and the related support equipment?

Answer. The 31 December SAR shows a unit cost for the first (deleted) torpedoes of (deleted). It should be emphasized that a significant part of this cost represents initial start-up costs for production and is non-recurring. Navy in-house support costs are additive, however, and bring this fully supported unit cost for this small buy to (deleted).

Question. Over the life of the program, what is the estimated program unit cost of the MARK-48 Mod-0, and give the same information with respect to the Mod-1?

Answer. The currently estimated program unit cost for either weapon is about (deleted) on the basis of total program cost per production torpedo. However, it should be understood that this estimate is probably on the high side, because we do not know how much effect the holding of a multi-year follow-on production competition for this torpedo will or might have on costs after the initial design competition has been decided. Experience in previous torpedo programs like the MK 46 program indicates that a production competition can result in substantial program savings after we have a firm design and a good basic documentation package.

Question. Please explain why the Mod-0 is not satisfactory and effective for the anti-shipping role?

Answer. For the full anti-shipping role, the Mod-0 [deleted].

Question. I am told that the proposal to increase the [deleted]. Is this correct? How effective would such a torpedo [deleted]?

(The information is classified and was retained in the Committee files.)

Question. Will the Mod-0/2 use the same [deleted] components as the Mod-1 for the anti-shipping role or will the Navy develop a new [deleted]. If not, what is the justification for developing a new anti-shipping [deleted] for the Mod-0/2 when one already exists for the Mod-1?

Answer. The Mod-2 can use either the same [deleted] as the Mod-1 or it can use the [deleted] for the Mod-1. The final decision as to whether to use the [deleted] in the Mod-2 has not yet been made pending further in-water testing.

Question. Why has the Mod-1 torpedo had relatively few development problems to date as compared to the Mod-0? Have all of the Mod-0 problems been resolved and have tests demonstrated this to be a fact?

Answer. There have not as yet been problems in the Mod-1 program of equal magnitude to those we found in the Mod-0 program. Some of this is no doubt due to the fact that the Mod-1 contractor had more recent experience in designing a modern torpedo guidance system because this contractor had been engaged in such a task under one of our advanced development programs. However, the Mod-1 is not yet as far along in its tests as is the Mod-0 and we are watching carefully the current pre-PPT test program for any signs of a serious problem. So far none have turned out to be major.

All the Mod-0 problems have been resolved, we believe, and tests support this view. The Naval Ordnance Systems Command has certified this fact.

Question. To test the MARK-48 torpedo special targets called the MK 27 are required. Does the Navy have an adequate supply of these targets to test both the Mod-0 and Mod-1 prior to making a decision on which torpedo to select for the fleet?

Answer. Yes, sir, we consider we have the minimum number required to satisfactorily complete testing.

Question. Assuming no major development problems are encountered in converting the Mod-0 to a Mod-2 dual purpose torpedo, when would the first Mod-2 be ready for fleet use as compared to the Mod-1?

Answer. The first Mod-1 would be introduced in [deleted] and the first Mod-2 in [deleted] according to current planning.

Question. Included in the cost of the Mod-0 torpedo contract is a Technical Data Package that can be used for possible competitive procurement. Does the Navy plan to introduce competitive procurement for the Mod-0 or the Mod-1?

Answer. That is certainly a consideration. The savings that can be expected from competitive procurement are well recognized and we will give a multi-year follow-on competition careful thought.

Question. In planning to procure the Mod-1 with FY 1970 and FY 1971 funds, is not the Navy going into a procurement program before completion of the development and testing cycle?

Answer. Yes, sir, this is true; however, part of the decision process will be based on producibility and production cost which will be available as a result of these buys. It is important to understand that the reliability of a new item of any type is dependent in part upon the basic design of the item and in part upon the production line, quality control process, and production check-out instrumentation that must be developed to produce the item in quantity lots. The testing and evaluation of the required production process is, therefore, an important part of deciding which torpedo is more "producible." The initial limited production buy permits these evaluations and keeps the production lines operating at minimum capacity until testing is complete. Were production halted, we would incur additional costs for re-starting production and additional delays in getting the torpedoes into inventory.

ULMS PROGRAM

Senator McInter. In your opinion, would the undersea long-range missile system (ULMS) increase the survivability of our deterrent at less cost than upgrading our MINUTEMAN force through silo hardening, introducing mobile launchers, or ABM deployment?

Dr. Frosch. That puts me in a difficult position. Senator McIntyre. Why not give your answer?

Senator McIntyre. Why not give your answer?

Dr. Frosch. From the Navy's point of view, the answer is simply "Yes."

Senator McIntyre. OK.

Dr. Frosch. Our putting the missiles to sea, if carefully designed, can be more survivable and at least equal cost, and from our estimate so far, cheaper.

Senator McIntyre. This next question I would suggest that you

be careful on.

PROGRAM COST

What do you estimate will be the total cost to develop and deploy ULMS? How much per copy is this based on total program cost and what quantity do you estimate in your pricing?

Do you want to take a crack at that for the record?

Dr. Frosch. I think I can give a simple answer that might have to be added to in the record. That is, in my opinion, it is too early in the process of defining ULMS and designing it to make a sensible price estimate for the total system or the individual units. I think it is likely to be at least a year or more before the time will come when we have defined it precisely enough and understand it well enough so that a sensible estimate can be made.

Senator McIntyre. Would announcement of approval for initiation of development of ULMS, in your opinion, have a detrimental effect on the SALT talks and lead to another upward spiral in the arms race?

Dr. Frosch. No, I do not believe it would. I think that putting things to sea may well have a stabilizing effect, and I think we can expand on the logic of that for the record, Senator.

Senator McIntyre. All right. (The information follows:)

Approval of ULMS development, in my judgment, would contribute to stabilization of the nuclear force balance. The deployment of an additional system which is relatively invulnerable to counteroffensive measures would reduce the likelihood that the Soviets might gain any substantial military advantage by a attrition attack. It would thereby reduce their incentive to attack the United States. They might be forced to accept a mutual deterrence position and perhaps respond with an augmented ballistic missile defense system in preference to further escalation of nuclear offensive forces. Further the deployment of systems whose survivability is measured in days or weeks allows ample time for decision by national authorities in a crisis situation and reduces the possibility of unwitting escalation to nuclear conflict.

DEVELOPMENT SCHEDULE

Senator McIntyre. In your estimate on ULMS, giving the descriptive summary of the R.D.T. & E. program, there is a total estimated cost of [deleted] for the development. Do you support that figure?

Dr. Frosch. That is the best estimate that we have been able to make at this time. In my personal opinion, it cannot be a very good estimate.

Senator McIntyre. Last year Congress reduced your request for the S-3A from \$165.4 million to \$140 million.

What effect does this have on your development schedule?

Dr. Frosch. The principal effect was to force some rephasing of some of the efforts, however, I believe that in the overall schedule, we expect to meet the original dates. There has had to be some rephasing of funding, and thus the work being done by the contractor. I can provide details of that for the record.

(The information follows:)

The reduction of FY 1970 funds required a modification to the Lockheed contract to revise LOTS I, II and III prices. These adjustments in the payment schedule and in-house funding requirements were accommodated by displacing some LOT I tooling items into LOT II and delaying some LOT II support items. The overall result of these adjustments has not changed original milestones established when the contract was awarded in August 1969.

LOCKHEED CONTRACT DIFFICULTIES

Senator McIntyre. Did this cut require reopening of the development contract with Lockheed, California?

Dr. Frosch. I believe it did not.

Senator McIntyre. What effect may the current Lockheed financial

difficulty have on this contract?

Dr. Frosch. I am unable to say at this point. This contract and the division of the company in which this contract is has not been directly involved, I believe, in the programs that have had the major contractual problems. What relationship this will have to any final decision on the Lockheed claim and the Lockheed financial problem, I am unable to say.

Senator McIntyre. What effect did the General Electric strike have

on the engine development program?

Dr. Frosch. It appears to not have had any major effect, sir.

TEST FLIGHT PROGRAM SLIP

Senator McIntyre. Regarding the S-3A ASW aircraft, your descriptive summary states that the flight test of the GE turbo fan engine in a test bed aircraft (B-47) will commence in [deleted] and that first flight test is planned in [deleted]. However, in your statement, both dates are stated as 2 months later. Is this an indication of a slip in your program, and will this result in an increase in total program cost?

Dr. Frosch. Pardon me, Senator. I misstated the effect of the GE strike. I had thought there was no effect. The effect of the strike has been a small amount of delay. The military qualification test, for example, is expected to slip now from [deleted]. I would not expect that small amount of delay to have a noticeable effect on the cost of the

program.

Senator McIntyre. We understand that six of the eight S-3A test aircraft will be bought under the R.D.T. & E. program with the remaining two being included in your fiscal year 1971 PAMN budget for \$79 million. The explanation is that these two will be refurbished after the test program is completed and placed in inventory. Is this consistent with your experience last year on the F-14A when the Congress transferred all the test aircraft and funds from PAMN to R.D.T. & E.?

And explain how this justifies a development program approximating

\$150 million?

Dr. Frosch. Well, this is not consistent with the action of the Congress in the F-14, but it maintains a continuation of the general policy and logic that the Defense Department has used to make the division between R.D.T. & E. aircraft and PAMN-paid aircraft. That is, the rule has been that if an aircraft is of no use after development, then it must be paid for in development. But if it is of operational use after development, then it is paid for in procurement of aircraft.

The congressional action on the G-14 essentially overturned that

policy in that case by legislation.

I do not understand the last part of the question, Senator.

Senator McIntyre. Did you, as a result of the action taken by Con-

gress last year, reclama?

Dr. Frosch. I believe we did. There were several stages of congressional action. The first stage, I believe, was to transfer three of the aircraft in PAMN into R.D.T. & E. and cancel the other three—we are talking to the F-14—and cancel the other three, so that we were told to carry out in R.D.T. & E. a test program with nine aircraft. This we reclamaed, both with regard to the shift from PAMN into R.D.T. & E. and with regard to the test program.

We successfully convinced the Congress that it was unfeasible and unwise to try to carry out the test program with only nine aircraft. So they restored the three aircraft, but instisted upon the transfer

from PAMN to R.D.T. & E.

E-2C AIRCRAFT SCHEDULE

Senator McIntyre. The E-2C carrier based airborne early warning aircraft is included for \$47.7 million in the R.D.T. & E. budget. An additional \$112.3 million is requested to procure three aircraft and includes \$20 million for advance procurement. Is this program on schedule?

Dr. Frosch. The E-C program is on schedule.

Senator McIntyre. Will the [deleted] million indicated as additional R.D.T. & E. required for future years complete the development program?

Dr. Frosch. I believe that that is correct, that will complete it.

LAMPS HELICOPTER PROGRAM

Senator McIntyre. The destroyer helicopter system (LAMPS) is included for \$13.5 million in fiscal year 1971, compared with \$3 million in fiscal year 1970. When this program was briefed to our R. & D. Subcommittee we were advised that the helicopter is needed to fill a gap in our ASW and [deleted] defenses. Will you elaborate?

Dr. Frosch. One of the key problems in a [deleted] defense is to

see as far away as possible [deleted].

The limitation for doing this from a surface ship is [deleted].

In the ASW problem, we have for sometime beeen using sonabuoys and sonars that are deployed away from the surface ship and thus extend its sonar range. In addition, there are many circumstances in which the range of the sonar on the surface ship exceeds the range of the weapons that the surface ship has to attack the submarine. It is not

unknown for a surface ship to get detection on a submarine at ranges as high as [deleted]. We do not have weapons systems that can be fired against submarines at that range with sufficient accuracy at terminus to be satisfactory.

A second purpose of the helicopter is to carry sensors and weapons out to ranges that will be useful along with the surface ship's ASW

and sonar system.

In addition, we expect these helicopters to have value for the surface ships in what I might call a minor logistics role—that is, carrying urgent parts and messages and equipment among ships that are operating together.

[Deleted.]

Then in addition, when one has a helicopter available for those primary purposes, it is also available for search and rescue purposes, for medical evacuation, and so on. But the two primary purposes are to get the [deleted] and away from the ships for the [deleted] defense, and to be able to get weapons and sensors aways from the ship for ASW.

Senator McIntyre. Why aren't other systems, either in inventory or under development, adequate to do the LAMPS job? Include con-

sideration of an extended range ASROC.

Dr. Frosch. The extended range ASROC would only solve the single problem of delivering an ASW weapon to a greater range. But it could not deliver it to as great a range as the helicopter could; also, it would not have any way of localizing the submarine at terminus, so it would need to have a weapon in it whose range was good enough to cover the inaccuracy and uncertainty in the sonar-derived position. The LAMPS helicopter could do a final localization before it dropped the weapon. Of course, the ASROC, whether extended in range or not, could not do any of the [deleted] jobs, the logistics jobs, and so on.

P-3 AND S-3A AUGMENTING PROGRAM

Senator McIntyre. I think it was during consideration of the LAMPS destroyer helicopter system that I began to wonder as to how many gaps you were trying to fill with this ASW defense system. I had in mind, for instance, the P-3 and the S-3A. Are these not capable of

doing this job?

Dr. Frosch. They are capable of doing an ASW job, but a different one. The P-3 is a dual-purpose aircraft; that is, it is a surveillance and search aircraft for surface ships as well as searching for submarines. It is intended to follow up and do specific-area search for submarines in places where, either because of [deleted] information or other information, we think there is an enemy submarine. But it would be likely to be doing this well away from any particular naval task group.

The S-3A is designed to carry the same kind of characteristic capability as the P-3 to sea, so that when a fleet is operating in an area which is far away from land bases we have available to us for the P-3,

that same kind of work can be carried on.

Now, in task groups in which there are not S-3's—for example, if one had an attack carrier, or even if there are S-3's, the S-3's would probably be operating at [deleted] or more miles from the task group, trying to provide an outer screen. The destroyers are usually used to provide inner-screen detection and protection for the capital and major

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ships; that is, screening perhaps out to a distance of [deleted] miles, but frequently as close as [deleted] miles.

The LAMPS is intended to give them a slightly extended weapons

punch in this close-in screening objective.

Essentially all of these military systems can be regarded as defense systems, whether used offensively or not, but also having a defensive purpose, tend to be defense in-depth systems; that is, we try to arrange an outer perimeter that has a capability, and then one or more inner perimeters that give a closer and tighter defense.

This is the way which historically, and for good reasons that can be demonstrated analytically, we answer the problem of getting the attacking submarine before he can get to the most valuable ship in the

collection.

Senator McIntyre. I think what is bothering me is that when we take a look at the MARK-48 torpedo and hopefully say that, by the [deleted] this will be substantially in inventory in the fleet, and we look at the tremendous gain and advance that all this money has cost us, we can sit back and say, well, it cost a great deal, but at least we have accomplished a tremendous leap forward.

Now, just a minute ago, in talking about this helicopter, you talked about a slight extension. What we are concerned about is that you spend a lot of money on this R.D.T. & E., and all you are doing is filling a small niche, we shall say, in the overall defense perimeter, or you are getting a slight extension of something that would be nice to have.

We are very concerned that there have been many expenditures or many programs where we did not obtain a sufficient advance, a move-

ment forward, or a gain in capability for the money expended.

Dr. Frosch. Well, I used the term, "slight extension," with reference to the kind of extension out from a task group that the S-3 represents. That is, we would not be extending the weapons range in ASW of the ships with the LAMPS to anything like the [deleted] miles that the S-3 can. We would be extending to a range that might be [deleted] miles.

The reason for interest in LAMPS is because of the collection of jobs it can do. [Deleted.] That, combined with the ASW extension of weapon range for the destroyer, makes a very strong capabilities mix.

There are a number of people who feel that the future of the destroyer type of ship—that is, the ship which is used for convoy escort, for carrier escort, for gunfire for ASW, and so on, is closely bound up with the ability to give it some kind of air capability to get its [deleted] to extend its range somewhat. So I think this is not a marginal capability we are looking at; it is a real improvement.

TACTICAL AND OPERATIONAL PROBLEMS

Senator McIntyre. Mr. Secretary, is it feasible to land a 6,000-pound helicopter on a destroyer, in an operational environment with average sea conditions, without either the pitching deck or the under-

side of the helicopter suffering significant damage?

Dr. Frosch. That question puts its finger precisely on the technological problem that needs most work. It has been done. The Canadians are landing significantly larger helicopters on some of their ships. The French have a system that they demonstrated off Norfolk last Tuesday, that they are working with for doing precisely that. We believe it can be done, and in fact, that is one of the first important jobs of the LAMPS program, along with looking at the various

commercial helicopters that are possibilities for this job, to figure out what is the best way of approaching that problem of landing and takeoff and to get a higher degree of assurance that, in fact, we can do this.

The third piece of the technological problem is to get a helicopter that is reliable and maintainable enough so that it can in fact be used sensibly operationally with a small maintenance crew on a small ship.

Senator McIntyre. I think the record should indicate what the size of the destroyer is that we are talking about. Is that 8,000 to

10,000 tons?

Dr. Frosch. No; we are talking about destroyers which are in the 4,000-ton class up.

Senator McIntyre. 4,000 tons? Dr. Frosch. 4,000 tons and up.

Senator McINTYRE. That is a smaller ship than I think they indicated to us in the subcommittee hearing on this particular program. I think they talked about a 6,000- to 8,000-ton ship.

Dr. Frosch. They were probably referring to the 963 class that we are looking at for construction now, which is about 7,000 tons, I

believe.

Senator McInter. We do not think of building destroyers these

days of 4,000 tons, do we?

Dr. Frosch. No; the 963 class is aimed at about 7,000 tons. But we own and are building a number of DE's that are in the 4,000-ton class.

Senator McIntyre. You are not going to build this helicopter to go on those DE's? of 4,000 tons?

Dr. Frosch. We would like to.

CHART SHOWING PROGRAM STATUS

Senator McIntyre. I am not going to get involved this morning on this, but it seems to me that this was pretty clear when the chart was produced for us on the 6,000-pound helicopter, that chart showed that the figure was 108 of our existing destroyers could handle the 6.000-pound helicopter. That eliminated another 150——

Dr. Frosch. It eliminated the FRAM-1 and 2. We have the precise

chart. Perhaps we should offer it for the record.

Senator McIntyre. All right. (The information follows:)

PROGRAM STATUS-PROPOSED TECHNICAL APPROACH, NOVEMBER 1969

Number in class	Number in class
Ship class: FRAM I 80 FRAM II 46 DE-1037 2 DE-1040 10 DEG-1 6	Ship class—Continued DE-1052 44 DLG-26 5 DLGN-35 7 DD-963 30 DLGN-38 36
NUMBER OF SH	IPS CONSIDERED

Compatible with ship classes	Total 234
All	
	108
Loogle	
	All

HELICOPTER PROGRAM DEFINITION

Senator McIntyre. Is the 6,000 pound requirement merely an interim capability as was speculated in a recent issue of the Armed Forces Journal? If so, why shouldn't the program be limited to avionics, which represents the major technical problem, and defer

contract definition to later years?

Dr. Frosch. The intention is not that it be interim, but that it be the system. What we want to do is to pick essentially a commercial helicopter, an existing helicopter that is in production, and make the minimal changes that can be made to the airframe and to build, then, the avionics that are necessary to operate it to do these jobs, and not to develop specific new weaponry or sensors, but to adapt existing weaponry and sensors essentially in a kind of kit changeable form into the helicopter. This is neither an attempt to build a new helicopter nor a brand new total weapons systems.

We have not yet finished the Specific Operational Requirement nor the Technical Development Plan. So some of this is still subject to change before we really march on in a major way. But the idea is to modify a commercially available helicopter and not to develop a new

one from scratch.

Senator McIntyre. How long do you estimate it will take to get

the equipment down to size to fit the avionics?

Dr. Frosch. Well, lots of pieces of equipment, I think, are of a size that will fit the avionics. It is a matter of putting them together in a sensible system way, and of picking equipment which is suitable for this purpose. It depends somewhat on the helicopter. We are starting out using for testing the UH-2. Probably it is likely to take a year or two to pick equipment and do the first experiments.

Senator McIntyre. A year or two? Then why not delay contract

definition?

Dr. Frosch. Contract Definition is part of the process of getting to the point where the selection will be done. What we would do in Concept Formulation is demonstrate that there were some helicopters that were suitable, that there was some equipment that could be put together but that the development of the equipment that would specifically go into the helicopter would start after the contract definition process. That is how we get to it.

The only way to avoid that would be to do something in which we did not do a contract definition at all, but went some other route. As long as we do a contract definition, that is what starts the develop-

ment process.

Mr. Fine. Would you provide for the record a statement which would explain the significance of the timing of making your avionics package the size that you need to fit in an available type of helicopter that could be obtained from commercial sources, and explain why, timewise, your plan to initiate contract definition in 1971 is necessary, as opposed to delaying that until fiscal year 1972? And indicate the dollars that you include in your estimate of a contract definition.

Dr. Frosch. All right. (The information follows:)

Your question has two parts, which will be answered separately.

First, what is the significance of timing in making the avionics fit an available commercial helicopter and why is it necessary to initiate contract definition

n 1971 as opposed to delaying it until 1972? As mentioned earlier, there are no commercial helicopters available that can be placed aboard ship and operated at sea. The salt air and salt water environment would render them useless in a very short time by corrosive action. All other marinized, or sea qualified, helicopters are too large to fit aboard the small ship classes spoken of earlier. Although the SOR has not been completed, it appears that a helicopter of about 6,000 pound gross take-off weight or larger will best satisfy overall mission requirements. In any event, the plan will be to modify an existing helicopter that most nearly meets the specified mission requirements and equip it with the desired sensors, weapons and other equipments necessary to provide the desired capabilities. The advantage of this approach, that is to use or modify existing equipment, is that it is expected to save time and money. The other approach would be to develop an avionics package to accomplish the Anti-Ship Missile Defense Anti-Submarine, and other missions along with a new helicopter. This approach would be too expensive and take too long, perhaps as long as seven years. The present plan will provide a slightly less capable system in a shorter time frame. We expect to be ready to enter contract definition during the later part of FY 71, and initiation of contract definition at that time would save about three months in the overall development time.

The second part of the question, what is the dollar figure estimate for contract definition? [deleted] million dollars is estimated to be needed for contract definition. As planned now, three contractors will be involved and they will be funded in two increments. The first increment of [deleted] million dollars each will be paid in Fiscal Year 1971 and an equal amount to each contractor in Fiscal Year

1972.

FOREIGN PROGRAM DEVELOPMENT

Senator McIntyre. You did mention the fact that a couple of foreign nations have been successful in landing a helicopter successfully on

this 2,900 ton ship?

Admiral Davies. Canadian destroyers are slightly less than 3,000 tons. The French destroyer that was here earlier this week was 2,900 tons. The Canadians that are landing the SH-3 onboard, the gross weight of which is much greater than—I was thinking 15,000 to 18,000 pounds. It is a much bigger helicopter.

The French helicopter is 4,500 pounds.

Senator McIntyre. One of the reasons that the subcommittee hearing, dealing specifically with LAMPS, interested me in the size of the destroyer that you plan to use it on was, that unlike my old idea of the destroyer, I found it to be a ship size of what I would call a cruiser. Not being a Navy man but having talked to a lot of men who rode the tin cans—as they call them—I had visions of this helicopter with its double package—two helicopters—sitting on this destroyer at either end and, because of sea conditions, being entirely inoperable. Now, what thinking have you done about how often these helicopters would be unable to take off because of sea conditions because they could not possibly come back and land?

Admiral Davies. This has been looked into, of course, by the Canadians and the French, both. The ships have systems to assist in this

landing operation. The Canadian system is called [deleted].

[Deleted.]

The French—I asked the commanding officer of the French destroyer Monday at what sea state he could operate in. He said that their roll is [deleted]. However, he stated that in his trip coming across the Atlantic he was able to exercise a helicopter every day.

There are also, of course, stabilization—the French ship is not stabilized. Some of the Canadian ships are stabilized. There is stabilization equipment to reduce the roll of the ship, so you are able to equip

the ship, in other words, to make this possible in quite high sea states. Senator McInter. Do you have to add something to the ship?

Admiral Davies. Yes, in this case, [deleted] equipment on the ship. Then the stabilizer is a set of fins underwater on the ship, controlled by a gyroscope, which we have on some of our ships.

AEGIS PROGRAM BUDGET REQUEST

Senator McIntyre. Mr. Secretary, the amount of \$75 million is requested for the Advanced Surface Missile System (AEGIS) for which RCA was awarded a contract to initiate engineering development in December 1969. What is the total amount of that contract?

Dr. Frosch. \$252.9 million.

Senator McIntyre. Is it consistent with your estimated total development cost of [deleted] million?

Dr. Frosch. Yes, it is. The number is [deleted] million.

Mr. Fine. We will check that. (The information follows:)

Your figure is correct for the RDT&E total funding as shown in the Congressional Budget Book; however, advanced development projects, SAM-D commonality studies, and exploration of certain state-of-the-art developments were inadvertently excluded from prior year funding totals. The FY 1968 and prior total should read \$13.9 million thus giving total estimated development cost of [deleted] million.

BUDGET JUSTIFICATION

Senator McIntyre. That is something I am glad you brought up. I do not want to have happen what happened last year. Are there any revised figures that you gentlemen have before we go to the floor to defend this budget? If so, please get them over to us. Last year, the Air Force called up and said they had \$59 million that they forgot to add into the program, which was known as chemical warfare. Now, in and of itself, it was \$59 million worth of clusters I think, that they drop—bomb clusters. But it added fuel to the fire on that particular subject at the time.

SYSTEMS DEVELOPMENT PROGRAM

Is the development program on schedule. sir?

Dr. Frosch. Yes, it is. Having just begun, that is not a very strong statement.

Senator McIntyre. When do you expect to achieve initial operational capability?

Dr. Frosch. Let's see—the IOC is [deleted] is the predicted IOC date.

Senator McIntyre. Do you you have, to your own knowledge, any significant technical problems?

Dr. Frosch. Not to my own knowledge at the present time.

Senator MoIntyre. You previously advised our R. & D. subcommittee that the RCA contract includes ceiling price options for units in lots of [deleted] for first year's buy with a per unit cost of [deleted] respectively. What are your present plans, whether or not approved by OSD, for total procurement quantity and how much would this cost?

Dr. Frosch. I do not know that that is totally defined, but I will try to find out—we do not seem to have it now—and put it in the record.

Senator McIntyre. We would like that figure for the record, please.

Dr. Frosch. We can speak to it now, Captain Sappington can, or we can put it in the record.

Senator McIntyre. Captain Sappington?

Captain Sappington. The number of systems to be procured will be dependent upon the shipbuilding program for the DLGN class of ships. This is an indeterminate number at the present time. We are starting on a program to include the Aegis system. How many of those ships Congress will authorize in the next 5 to 10 years is something you cannot as yet estimate.

Mr. Fine. What is the Navy requirement for the next 5 to 10 years? Captain Sappington. I would have to provide that for the record,

sir. I do not have that with me.

Senator McIntyre. Well, Captain, you supply that information for the record, please.

(The information follows:)

The approved NAVY shipbuilding programs provides for commencement of construction of [deleted] DLGN 38 class ships (formerly DXGN) through 1975. The present schedule for AEGIS indicates that the system can be available for installation on the [deleted] of these ships and on all subsequent new DLGN ships which may be authorized on into the 1980's. The engineering development contract requires the contractor to conduct at sea tests of AEGIS prior to the production release. Should any slippage occur in AEGIS programs because of funding or other constraints the weapon system would be installed in the [deleted] DLGN. In this situation the TARTAR-D system now being procured for earlier DLGNs would be installed in the [deleted] DLGN.

We recognized that the development contractor would be the producer of at least the first years buy of AEGIS systems. Therefore, in our effort to obtain more realistic production cost estimates, an area of considerable concern in the past where only budgetary costs were obtained, we required the contractor to submit maximum ceiling price offers for first year procurement of production quantities of either [deleted] systems. The reason for the step ladder quotes was to bracket probable shipbuilding authorizations. A special provision also allows the government to negotiate procurement of odd quantities such as [deleted] etc. These maximum ceiling price offers, subject to downward adjust-

ment through negotiations are:

Quanity
[deleted]

Unit Price (* Million*)
[deleted]

The Navy's concern over high production prices is continuing, and the AEGIS contractor is conducting a study with the Navy to define areas of possible additional cost reduction. The results of these studies will be considered prior to negotiation and award of any production contract.

Although the current FYDP contains a maximum of [deleted] DLGN 38 class ships for AEGIS at present, we anticipte that the cost reduction studies will also develop proposals for smaller, lower cost AEGIS systems which would be applicable to other ships such as the DXG and the DD-963 class ships. These added

requirements would tend to further reduce the production unit cost.

The synopsis of the AEGIS procurement technique explains our concern over controlling cost growth by establishing the maximum ceiling prices within the competitive atmosphere and the Navy's efforts to further reduce production cost during engineering development by continuing our cost reduction studies. Our prime objective is to obtain the minimum system required to meet our performance requirements at the lowest possible cost.

The flexibility of the shipbuilding program in the out years as dictated by requirements and budgetary constraints makes it impracticable to estimate a total

program cost at this time.

SHIP CONSTRUCTION

Senator McIntyre. Mr. Secretary, your descriptive summary states that scheduled production is to be compatible with new ship construction and that the first system is scheduled to be dockside in mid-calendar year [deleted]. Do you anticipate that a sufficient number of ships will be authorized for construction to warrant the development and procurement of AEGIS? Or, do you consider that a ship modification program also may be involved?

Dr. Frosch. We do not expect to retrofit AEGIS by modernization into already constructed ships. We expect it to be a system which will go into new construction ships, and we are expecting enough ships of the guided missile classes to be built so that it becomes a sensible eco-

nomic program.

ENGINE AND AVIONICS BUDGET REQUEST

Senator McIntyre. The \$50.2 million requested for the F-14B/C supports work on both the advanced technology engine (F-14B) which recently was awarded to Pratt & Whitney; and the advanced technology avionics system (F-14C) to provide substantially higher performance capability than the F-14A. How does the \$50.2 million break

between the engine and avionics efforts?

Dr. Frosch. All the money in that F-14B/C line item in fiscal 1971 will be for the advanced technology engine for the F-14B. We will not be doing any direct work on avionics for the F-14C other than work in exploratory development, which will continue. The actual prices for the advanced technology engine became known after the congressional backup books were made, and we decided to support the engine and continue the avionics work in exploratory development.

Senator McIntyre. Now, that is not consistent with a statement made by Admiral Connolly on Wednesday before the full committee, in which he stated that the F-14C development was to be dropped and that the funds included in fiscal year 1971 should be used for advanced

radar work. Would you care to comment on that?

Dr. Frosch. Unless Captain Ames would-

Captain Ames. Yes, sir, I was at that meeting. He said that the development on the F-14C was to be dropped out and the entire amount would be used for the engine. As a matter of fact, I made a statement following his statement that reaffirmed that is the current program.

Senator McIntyre. Thank you, Captain. We will check the tran-

script on that to see if we are misinformed.

Going back to that F-14B/C, how does the total development cost of \$620 million break between these two? That is, the engine and the avionic effort?

Captain Ames. What year was that?

Dr. Frosch. Well, the total. That is the total estimated.

Captain Ames. Well, right now, we are estimating the ATE engine development alone to be \$253.6 million and the installation of the engine in the aircraft to be \$29.4 million, for a total of \$283 million. That is consistent with the December 31 SAR report figures that I understand you have at hand.

Senator McIntyre. Then the difference between the \$283 and \$620

million would be the avionics cost?

Dr. Frosch. We shall have to check that out for the record. The avionics are not very well defined yet, so I do not know what that would be.

Captain Ames. Yes, sir; that would be it. I did not recognize where that \$620 million came from, but that would be correct.

TECHNICAL PROBLEMS

Senator McIntyre. Have any significant technical problems been encountered to date?

Dr. Frosch. In the engine?

Mr. Fine. Both.

Dr. Frosch. There have been none in the engine. The avionics for the C has not gone far enough to be defined as a system yet.

SCHEDULE DATE

Senator McIntyre. Is the scheduled IOC date of December 1973 for the F-14B attainable?

Captain Ames. Yes, sir; it is attainable. I personally suspect it might be a month or two later than that, because the first F-14B is scheduled for production in July of 1973. It all depends on the delivery of the engine, of course, and it would require a rather rapid training program, but it would be the December-January period of time.

BUDGET REQUEST JUSTIFICATION

Senator McIntyre. The F-14B/C aircraft is included for \$50 million in fiscal year 1970. However, no mention is made of a prior approval reprograming action, DOD serial number FY 70-55 which we have just received. It proposes to increase the fiscal year 1970 program from \$50 to \$54 million. Will you explain this and state if this will reduce the amount requested for fiscal year 1971 by \$4 million.

Captain Ames. No, sir; the budget was submitted prior to the time the exact fiscal funding flow was established in the recently signed contract. That additional \$4 million reflects the fiscal requirement in 1970 that was just recently defined in the contract signed. This does not decrease the fiscal 1971 requirement.

DUAL PURPOSE PROGRAM

Senator McIntyre. The Air/Launch Surface Launched Anti-Ship missile (HARPOON) is included for \$21 million. This compares with \$4.6 million in fiscal year 1969 and \$5.9 million in fiscal year 1970 and builds to a total development cost of [deleted] million.

What penalty in complexity and in the development cost are we paying to provide this dual-purpose capability missile to permit its launch both from an aircraft and from a ship? Hasn't the painful lesson of other dual-purposes programs like the F-111 Air Force-

Navy approach taught us anything?

Dr. Frosch. It has taught us that sometimes you cannot do it, but we have had other experiences that show that sometimes you can do it. For example, the STANDARD missile was designed to be fired from ships against aircraft in the TARTAR and TERRIER series. We took the STANDARD missile and adapted it into the

STANDARD ARM to be fired from aircraft against radars on the

ground and the sea surface. It turned out to be very successful.

I think that the key thing to be careful about is that the requirements, when you do a commonality thing like that, are in fact compatible and close enough together so that you have a real possibility

of doing something in a common way.

The other thing to remember is if you start down a line of commonality, you have to be very careful to be flexible and willing to draw the line and say, if I continue to be common, then I am making too many compromises, and be willing to give that up. It looks to us at the present time as though it should be possible to build a missile to be launched either from an aircraft or a ship to attack the same kind of target, a surface target. But one of the earliest things to be done in the next stage of the program is to do some hardware work on seekers, particularly, to make sure that that kind of commonality is in fact possible.

As you probably know from the history of the F-111 and similar programs, the Navy research and development community has not always been the most vocal supporter of commonality, and we are inclined to be rather careful about it. But it is something that we have done in the Navy frequently; that is to say, build something that can

serve several purposes.

Mr. Fine. There is a distinction to be made between commonality where you use a single platform to launch a multipurpose missile or weapon, and where you have different types of platforms to employ the same weapon or for similar purposes. The problem of cost and complexity is in the latter case, really, and much more pronounced than it is in the former. This really is the point of the question.

Dr. Frosch. Of course. And I think the STANDARD missile case is an example. That is the kind of success we would like to achieve. That actually went very smoothly. It turned out that in the early aerodynamic drop tests of the STANDARD missile, which was one of the crucial problems that people were worried about, there was a particularly good firing and separation from the aircraft. The point defense missile system is another example, where we have successfully taken the SPARROW air-to-air missile and put it on a ship so that it can be fired. That is the direction we want to go.

But it is perfectly clear, and I entirely agree, that if in the early stages of development, it looks as if we are forcing a complexity just to get one device to do two purposes, then we shall certainly not

want to go on with it.

Mr. Fine. Do you want to identify the costs which relate to incorporating that second capability?

Dr. Frosch. We cannot do that yet.

COMPLEXITY OF PROBLEM

Senator McIntyre. You do not think the complexity of the prob-

lem is, at this stage anyway, of sufficient magnitude?

Dr. Froscu. The place where the complexity for this missile will lie is in the terminal acquisition guidance and maneuvering against the target. Since the target for both forms of launch is intended to be the same, and if that part of the problem can be solved, then probably the complexity that might be added by adapting the launch to the two different vehicles would be much smaller. At least, that is the hope.

Senator McIntyre. I would like you to comment on this question:

What argument is there against pursuing a single-capacity weapon.

What argument is there against pursuing a single-capacity weapon through development, and then after having proven successful, decide

if the second capability should be undertaken?

Dr. Frosch. There is no argument against that other than a delay of the acquisition of the second capability. I think if it looks to us early in the program as though there are any problems of complexity introduced by the commonality of two launch vehicles, then what you suggest is precisely what we would be likely to do—choose which of the two requirements took priority, aim most of the development at that, and then adapt it, if possible, afterwards.

Senator McIntyre. If we plan to employ this missile on aircraft such as the [deleted] would not the compatibility problems attendant to the aircraft represent major technical obstacles and involve sub-

stantial cost?

Dr. Frosch. Not necessarily. The main requirement for compatibility of the missiles with those aircraft is likely to be in the weight and an aerodynamic shape to insure that it separates reasonably cleanly. I think the weight is going to be the one that is likely to be restrictive, so the way that that problem might be solved would be to make the restriction on weight, which we can decide very early, and begin to look at the problems that the missile would have on the ship—thus if the weight poses a major problem, we should know it right at the beginning of the program.

In any case, what is frequently done, or what can be done when you take an air-dropped or air-launched weapon and put it on a surface ship is to add a booster to the basic airborne weapon. Then the total ship weapon is a little bigger and a little heavier than the aircraft weapon configuration. Which of the two problems is likely to be

more complex, I think, is not quite clear yet.

PROJECTED SIZE

Senator McIntyre. What is the projected size of this weapon? Dr. Frosch. It is expected to be about a [deleted] pound weapon as an air weapon and, would be, as I just outlined, a basic air-launched missile, probably, with an added booster for ship launch, so the ship-launched missile might be [deleted] pounds. The length of the device is estimated to be about [deleted] inches. I think that number is more precise than is warranted now.

Senator McIntyre. Mr. Fine was just telling me that you find when you get to the point that the aircraft is not capable of handling this [deleted] pound missile, you then go for a new engine for the aircraft, and it is like the chicken and the egg; there is always something

that you are coming up with.

Dr. Frosch. Not on this one. Neither of these aircraft will have a requirement for increasing the powerplant. Part of the restriction on the [deleted] and the [deleted] is not only the weight, but in the size of the missile, because if the missile is too large, then it will have sufficient drag to decrease the range of these aircraft, and that is one of their primary essential characteristics. So the aircraft maximum range is the restriction.

PROGRAM SCHEDULE

Senator McIntyre. Your schedule indicates that Phase C of Contract Definition will begin [deleted] and that an engineering development contract will be let on [deleted] with one of three contractors. Is

the program proceeding on schedule, sir?

Dr. Frosch. We have made some modifications to the program since that information was provided. What we are now proceeding to do is to go through some hardware experimentation phases and some design and validation phases in several of the Navy in-house laboratories. We would now expect to release an RFP sometime around [deleted] and select the contractors along about [deleted].

Senator McIntyre. If you are moving more slowly than originally thought, why should not this save some dollar amounts in your fiscal

1971 request?

Dr. Frosch. I think it is important that we are moving in a different way than one which is the formal contract definition. We are proposing to put a heavier emphasis on work in the in-house laboratories, to define and validate the device, and then to contract with the two contractors to develop the missile and have a fly-off before production. This looks consistent with about the same amount of money, but is a shift away from a paper competition between the contractors toward a hardware competition between the contractors, with heavy early participation by Navy laboratories.

Mr. Fine. Are you satisfied that \$21 million will still be needed

for that purpose in 1971?

Dr. Frosch. I am satisfied that it will, yes.

ULMS PROGRAM

Senator McIntyre. The Undersea Surveillance System [deleted] is included for [deleted] million. Through fiscal year 1970, for all appropriations, a total of [deleted] million has been invested in this system and an additional [deleted] million is estimated to be required through fiscal year [deleted]. Has this large investment turned out to have been worthwhile and has the usefulness of [deleted] been proven?

Dr. Frosch. Yes, [deleted].

Senator McIntyre Since this program was conceived and started almost 20 years ago, has not other technology and major weapon systems which have evolved since then overtaken this system?

Dr. Frosch. Of course, the technology that we are installing now is not the same as the technology that was installed 20 years ago.

Twenty years ago, [deleted].

Senator McIntyre. What other weapons systems have moved in on [deleted]. Could you enumerate some of them?

Dr. Frosch. I do not think that there is anything that has the equiva-

lent capability and characteristics [deleted].

There is a system which is called [deleted]. It is a system which is [deleted].

Senator McIntyre. In the briefing [deleted].

Dr. Frosch. Very heavy traffic.

Senator McIntyre. The thought occurred to me that somebody higher up ought to make a decision whether we ought to put some R.D.T.

& E. [deleted] at this particular time. Of course, that would not be within your purview, would it, Mr. Secretary?

Dr. Frosch. This will not be an R.D.T. & E. [deleted].

Senator McIntyre. Is not just on a mission of testing and evaluation?

Dr. Frosch. No, this is more than testing and evaluation. It will be a post-OPTEV for evaluation.

[Deleted.]

The program is somewhere in the transition between technical and tactical testing and operational use.

Senator McIntyre. It will not be operating all by itself off in some corner of the [deleted] will it?

Dr. Frosch. [Deleted.]

Senator McIntyre. In fiscal 1971 you plan to start work on the first [deletd] evaluation system. Why not gain some experience with the [deleted] system which will be completed in fiscal year 1971 before starting the [deleted] I am not talking about [deleted].

Dr. Frosch. I shall have to answer that for the record. I am not

aware of the detailed differences.

(The information follows:)

(The information is classified and was retained in the Committees files.)

UNDERSEA SURVEILLANCE PROGRAM

Senator McIntyre. Your advanced undersea surveillance program is included for [deleted] million and covers two projects. ASW surveillance for [deleted] million which produces improvements [deleted] and [deleted] million. The major item included is the [deleted].

Why is this major new development needed, and why should concept

formulation be initiated at this time!

Dr. Frosch. Well, this is a capability that we have been looking at for a long time. There are places where, as I mentioned before, we think it not feasible for one reason or another to put [deleted] and so on. The experimental work has proceeded to the point where it is sensible to look at what the precise [deleted] concept to be developed would be.

NAVAL LABORATORIES CHANGE

Senator McIntyre. On page 24 of your narrative justification book you state that the downward trend in unobligated reimbursable orders from \$50.9 million in fiscal year 1969 to an estimated \$15 million level of fiscal year 1970 and 1971 results primarily from the shift to the Navy Industrial Fund at many of the Navy's major laboratories. Will you explain the significance of this change?

Dr. Frosch. I would like Mr. Warsing to answer that.

Mr. Warsing. Senator, effective July 1, 1969, the Navy converted approximately 14 facilities to the Navy Industrial Funding system. The impact of this is that the orders which are now placed at the laboratories are picked up as reimbursements to the working capital fund where as in the former system they were reimbursed to the Research and Development appropriation. It is a change in accounting mechanics.

Senator McIntyre. Thank you.

FCRC AS GOVERNMENTAL INSTALLATIONS

The installation analysis which appears in your justification book is supported to cover Navy installations operated either by the Navy or by the contractor. Neither the Army nor the Air Force consider their FCRC's to be Government installation. Why do you include FCRC's such as the applied physical Laboratory, Johns Hopkins University, in this category?

Mr. Warsing. In the installation analysis format that we have employed traditionally includes the Federal Control Research Centers which somewhat complement the total facilities where we do our

inhouse work, sir.

Dr. Frosch. I think the point, Senator, is that there has been so much discussion of FCRC's over the years, and we have had considerable questioning on what are the facilities arrangements, what are provided, that we simply have felt it sensible to present to the Congress what the facilities dollar amounts are for the FCRC's.

Senator McIntyre. Will you suggest to the Office of the Secretary of Defense that uniformity be achieved in the way this is handled

next year?

Dr. Frosch. Fine.

LAKEHURST, N.J., INCREASE IN FUND REQUIREMENT

Senator McIntyre. The Naval Air Test Facility, Lakehurst, N.J., reflects an increase from \$1.6 million in fiscal year 1970 to \$2 million in fiscal year 1971 while civilian man-years drop from 171 to 169. What causes this increase in funds requirements?

Dr. Frosch. That is the research and development portion of this organization which is funded out of several appropriations. I think we shall have to figure out exactly what is going up and down in that total installation and provide it for the record.

(The information follows:)

Naval Air Test Facility, Lakehurst, New Jersey

The total funding level of NATF for the two years is essentially the same, \$6.2 million in FY 1970 and \$6.1 million in FY 1971. That portion funded by RDT&EN which is increased by \$400 thousand has been offset by a similar decrease in funding from O&MN. The decrease in O&MN is due to reduced funding requirements for "Short Airfield Tactical Support" equipment rehabilitation and aircraft launch and retrieval fleet support, while the increase in RDT&EN is required for range instrumentation and Class III and IV scientific and technical and photographic equipment at this facility.

APPLIED SCIENCE LABORATORY, BROOKLYN, N.Y., CONVERSION

Senator McIntyre. No funds are included in your fiscal year 1971 estimate for support of the Naval Applied Science Laboratory, Brooklyn, N.Y., although \$12.9 million was provided in fiscal year 1969 and \$11 million in fiscal year 1970. Your explanation states that this activity will be disestablished on June 30, 1970, and that, except for the part which will be transferred or discontinued, a successor organization Strategic Systems Navigation Facility, funded primarily from the Operations and Maintenance, Navy appropriations will continue in the present location. Will you explain why this is being done and provide the details for the record?

Dr. Frosch. Yes. This was done because we have been, as you know, under considerable pressure both from the Congress and otherwise to decrease the size of the in-house laboratory establishment and to make sure that what we are doing is as efficient as possible. Last year, we closed, transferred, dismantled and/or changed several laboratories, of which this was one. The bulk of this laboratory, NASL, was disestablished. One portion was left and retitled and we reorganized it for a particular mission. Some portions were transferred and the rest disestablished.

(The information follows:)

NAVAL APPLIED SCIENCE LABORATORY DISPOSITION OF FUNCTIONS

Function	Transferred to-	Disposition
Navigation	Naval Strategic Systems Navigation Facility, Brooklyn, N.Y.	Major program responsibility in support o the fleet ballistic missile program re- tained, other navigational work dis- continued.
Electronics	Naval Electronics Laboratory Center, San Diego, Calif.	Reduced in scope, with major portions of the interior communications and systems per formance effectiveness functions trans- ferred to the Center for Navy electronics work.
Material sciences and electrical	Naval Ship Research and Development Laboratory, Annapolis, Md.	Reduced in scope, with ships' related work transferred to the Naval Ships Research and Development Center.
Sonar reliability (AN/SQS-26)	Navy Underwater Sound Laboratory, New London, Conn.	
Chemical and biological warfare	Naval Weapons Laboratory, Dahlgren, Va.	Reduced in scope, with work related to detection of toxic materials transferred to the activity which has prime responsibility in other ordnance safety areas.

FORWARD FINANCING

Senator McIntyre. Final question: What is the Navy policy regarding forward financing as it pertains to the entire R.D.T. & E. appropriation! If it is different for Defense Research sciences, will you

explain?

Dr. Frosch. We normally follow the policy of funding everything on an annual basis as best we can. There has been one exception to this: When the THEMIS program was established, it was uniformally established in DOD at the direction of the Director of Defense Research and Engineering as a forward-funding program. That is to say, in the first year, each of them was given, I believe, the first year's money and two-thirds of the second year's money, and one-third of the third-year money. So only in those contracts that have been absorbed into defense research sciences, which were formerly called THEMIS, have we formally made any forward funding.

Quite a long while ago, perhaps 8 or 10 years ago, there was a policy in ONR to try to forward-fund some university contracts, but for no other reason than fiscal pressure, aside from any questions of

policy, that has not been done in the past few years.

Mr. Fine. When you say other than Defense Research Sciences, when you say that you normally fund on an annual increment basis, if you take a situation where you have a continuing major weapons systems development program, where the obligation of funds is not required until the fourth quarter of the current fiscal year, how far into the next fiscal year will those dollars support the effort of the contractor? Is

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there a major period that you would normally consider, or is it a full 12 months?

Dr. Frosch. I would have to get the answer to that for the record, because I think it is extremely variable, from contract to contract,

and may vary among the systems commands on policy.

Mr. Fine. Then let me ask this: Do you have any existing policy which indicates the extent to which such effort may be financed into the next fiscal year? I have in mind the fact that the Air Force, for example, is constrained by a period not to exceed about 3 months into the next fiscal year.

Of course, there are exceptions, and these can be recognized, but this is also an area that will be very fruitful with respect to an identification of dollars that are not in fact required for the program year.

Dr. Frosch. I do not really know the answer to that question. I am not aware of my having had to deal with such a policy question, but it may well be being done through either the procurement chain or the comptroller chain. I shall have to find out about that and answer for the record, Mr. Fine.

Mr. FINE. Thank you.

(The information follows:)

NAVY POLICY ON FORWARD FUNDING

NavCompt Instruction 7044.1C of 15 October 1969, Subj: Appropriation "Research, Development, Test and Evaluation, Navy"; Financial Administration of, states Navy policy with regard to forward funding. The pertinent paragraph follows:

Funding in annual increments. It is Department of Navy policy to program and fund in the RDT&E effort in annual increments. Subheads designated by NavComp are used to identify the funding of the program for each fiscal year and should be charged with the costs of the work programmed for that year. While the goal of this policy is that, insofar as practicable, the work be performed and the obligations be incurred in the initial fiscal year, it is recognized that the achievement of this goal cannot always be realized. Consequently, allocated funds are available for obligation, not only in the initial fiscal year, but until they are exhausted unless otherwise restricted by proper authority. Thus, if necessary, work programmed in a given fiscal year may be continued in subsequent fiscal years and the funds will normally be obligated in the given fiscal year subhead. In most cases, these funds need not and will not be reallocated to the subsequent fiscal year subheads. The extent to which it is practicable to perform the work and incur the related obligations within the initial fiscal year depends on the nature and complexity of the RDT&E effort involved. For example, routine RDT&E operation and maintenance efforts should normally be funded on an annual basis. Funding of such effort beyond the end of the current year is warranted only when absolutely necessary to ensure work continuity at a reasonable and practicable level, thereby avoiding a burdensome peaking workload at the end of the year. In contracts, complex procurements that are still in process at the end of the year and testing programs involving sophisticated development hardware necessarily overlap fiscal years.

PREPARED QUESTIONS FROM SENATOR SMITH

(Questions submitted by Senator Smith. The answers supplied by the Department of the Navy.)

Question. The Marine Corps undertakes unilateral development programs only when the programs of the other services do not meet its requirements. Is this arrangement satisfactory in your opinion and do you consider that proper emphasis is being given to research and development requirements of the Marine Corps?

Answer. In order to achieve economy and efficiency and to avoid duplication there can be no doubt that the Marine Corps should not attempt to duplicate the extensive R&D programs of the three larger Services. In accepting this modus operandi we insure, through early and continuous liaison, that the equipment

being developed either for us or concurrently with another Service's requirement does in fact meet Marine Corps requirements. This method of operation has been generally satisfactory, and we believe that adequate emphasis has been placed in meeting Marine Corps requirements. In the event that Marine Corps requirements are not adequately met, there exists the necessary mechanisms for remedial action either between the Services or at Departmental level.

Question. The description of the Airborne Electronic Warfare Equipment program in Advanced Development is your first reference in your budget activity discussion to Electronic Countermeasures. Since this is an area of increasing effort and cost, will you provide a list of all program elements and projects on this subject and amounts for FY 1969, 1970 and 1971? Will you include a brief discussion of their interrelationship and how coordination with the other services is accomplished?

Answer. Airborne Electronic Countermeasures R&D is pursued under the following Program Elements and Projects:

Florenti		Fiscal year-		
Element/ project	Title	1969	1970	1971
63206N	Airborne electronic warfare equipment			
W33-11	Airborne electronic warfare jam/deception	5, 5	4.4	
W33-12	Airborne 1R countermeasures	3, 8	2.8	
W33-44	Miniature expendable jammers	0	. 5	
W33-51	Integrated tactical countermeasures	Ò	O ·	[Deleted]
W33-55	Visual countermeasures	Ó	. 2	
64513	Electronic warfare ORC			
W33-14	Airborne electronic warfare QRC	2. 5	1.0	

Advanced development is pursued in the above projects and where inter-relationship exists, close coordination between projects is maintained. R&D is conducted in order to provide countermeasures capability in micro-wave, infrared, and visual spectrums.

The QRC project provides a funding for short-term projects designed to incorporate new equipments and techniques into the fleet at an accelerated rate to reduce or nullify existing or newly identified high priority threats.

The ultimate goal is to integrate countermeasures capabilities into one system (Project W33-51) in future tactical aircraft.

Close coordination with other services is maintained through both formal review and coordination of R&D programs and informal liaison at the project officer level.

Question. Under the title Airborne ASW Development you are proposing an \$8 million new engineering development program to continue projects evolving from the Advanced Development Program Airborne ASW Detection. Since no funds were provided either in FY 1969 or FY 1970 for this new program, under what program has such engineering development been supported previously?

Answer. The Airborne ASW Detection Systems Program (PE63201N) was begun to support advanced development efforts on airborne ASW sensors and related equipment. In the past, projects that successfully completed this phase were funded individually for the following engineering development phase. An example is Project 21–19, Integrated VP ASW Avionics (PE 64201N) that provided engineering development support for the P-3C avionics system. The advanced development effort was under Project 21–10, Advanced ASW Avionics under PE 63201N. Another example is DIFAR which has gone from advanced to engineering to operational system development. Program Element 64219N, Airborne ASW Developments, has been established to permit orderly transition of the smaller equipment or sensor projects into engineering development. The major programs will continue to be conducted under individual elements.

Question. Is the \$7 million requested in FY 1971 for Anti-Ballistic Missile Support identified with the Modified Phase II Safeguard program proposed by the President? Is it a competitive system?

Answer. The \$7.0 million request for Anti-Ballistic-Missile Support in FY 1971 is for Navy support to the basic SAFEGUARD Development Program. As directed by SECDEF in January 1967, the Navy provides and partially funds medium and intermediate range targets, using excess Polaris boosters, to be fired from the [deleted].

Question. You state that in the surface warfare area your fiscal year 1971 development program includes significant effort directed toward the availability of the weapons and ships that will shape the surface forces of the late 1970's and beyond. Under this heading you state also that these improvements in new development programs, such as project PHALANX, constitute the future missile and gun requirements of your concept of defense-in-depth against anti-ship missiles. Will you discuss your concept of defense-in-depth and explain what you refer to as the increasingly severe Soviet threat in this area?

Answer. The Navy's concept of "Defense in Depth" is based upon the fact that adequate defense against existing and future enemy threats cannot be obtained through use of a single hard weapon or electronic warfare defense system. The Navy must rely heavily upon the integration of various mutually supporting defense positions and subsystems designed to absorb and progressively weaken aircraft and missile attacks; to prevent initial observations of the whole position by the enemy; and to allow the commander to maneuver the components of his force. First, significant contributions are expected from airborne sensors, combat aircraft with air-to-air and air-to-surface weapons and electronic warfare measures (i.e., detection, jamming, etc.) in the initial phases of the threat action. Second, the contributions of long range shipboard sensors and of long and medium range surface-to-air and surface-to-surface missiles are factored into this concept to provide area defense and/or mutual support. Lastly, the concept emphasizes close-in defense in the form of Point Defense Missile Systems, electronic warfare deception and track breaking, existing gun systems and rapid-rate-offire, Close-In Weapon Systems such as the VULCAN/PHALANX Gun System now under development.

COMMITTEE PROCEDURE

Senator McIntyre. Mr. Secretary, I want to thank you, along with your supporting witnesses, for your patience and for your candor in replying to these many questions, all of which, I am sure, will be very helpful to us in trying to make recommendations to the full committee on this very vital area of the Navy's research and development, testing, and evaluation.

Dr. Frosch. I might mention, Mr. Chairman, that we have 15 minutes of film clips if you are interested in seeing some live hardware. Senator McIntyre. Do you have that gun that [deleted].

Dr. Frosch. No.

Senator McIntyre. I would like so see that. I am glad you responded to that. That would be a horrible thing for somebody to get up on the floor and say, what about this gun that [deleted].

Let us see the film.

Dr. Frosch. I would also like to mention, while they are setting up the film, that this is unfortunately Admiral Owen's last appearance here, since he retires as Chief of Naval Research at the end of this fiscal year. I am sure that you are as sorry about that as I am.

Senator McIntyre. We certainly are.

Off the record.

(Discussion off the record.)
(Showing of film clips.)

COMMITTEE RECESS

Senator McIntyre. Thank you again.

We are adjourned subject to the call of the Chair.

(Whereupon, at 12 noon, the committee was adjourned, to reconvene subject to the call of the Chair.)

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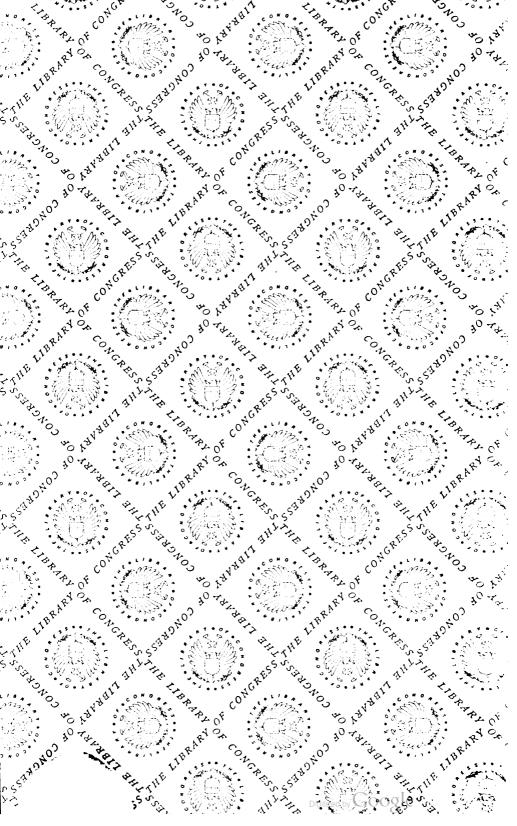
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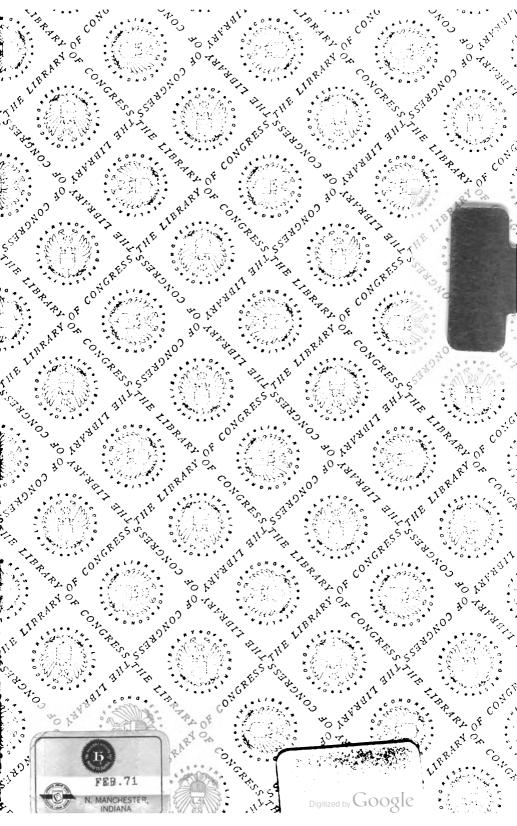
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